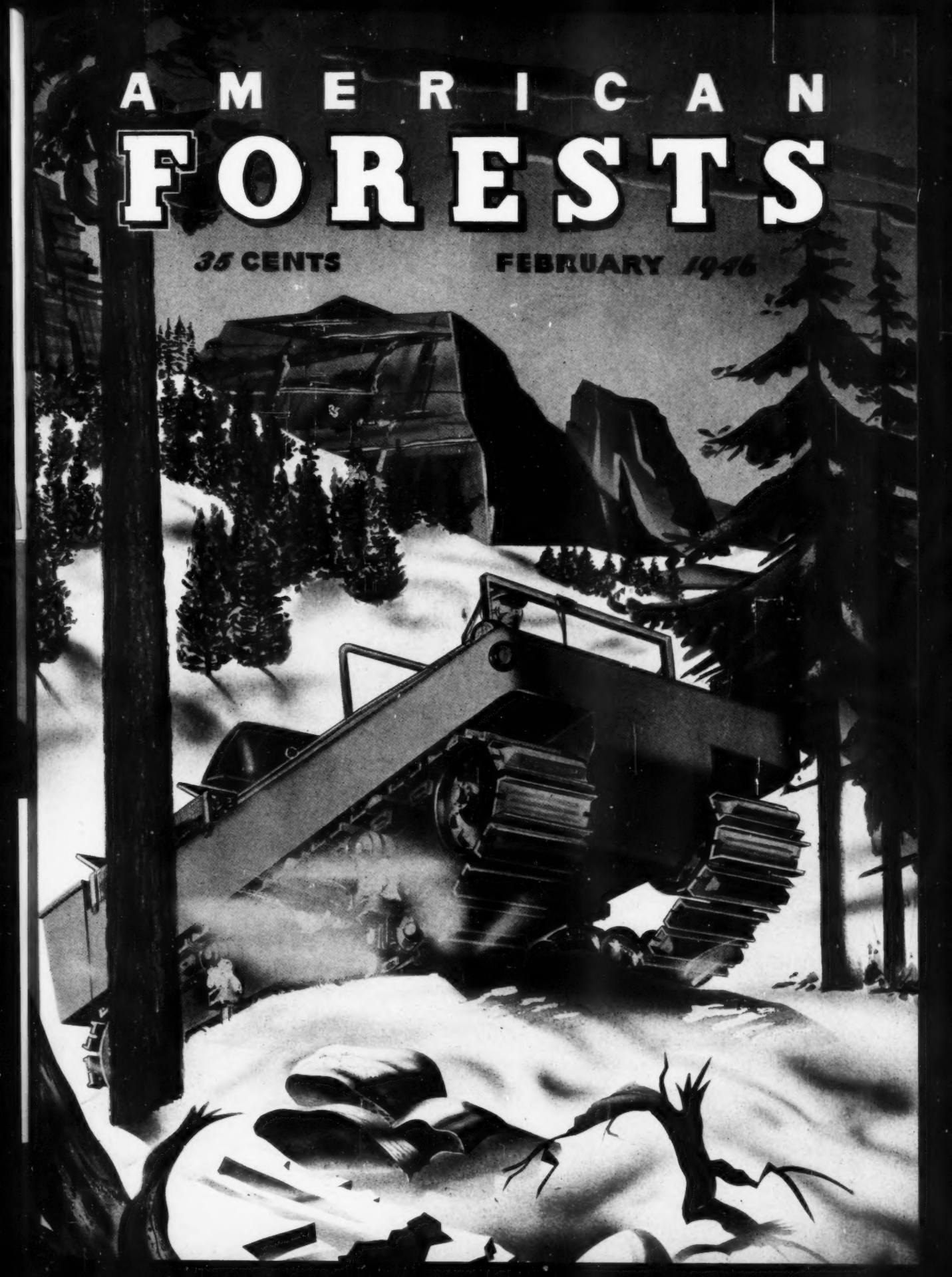
AMERICAN FORESTS

35 CENTS FEBRUARY 1946



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AMERICAN FORESTS

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Editor

LILIAN CROMELIN
Associate Editor

ALBERT G. HALL
Assistant Editor

FRED E. HORNADAY
Advertising Director

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The Purpose

The American Forestry Association is a national organization—educational in character—for the advancement of the intelligent management and use of the country's forests and related resources of soil, water, wildlife and outdoor recreation. Its purpose is (1) to bring about adequate protection and perpetuation of these resources by creating an enlightened public appreciation of the need of conserving them through wise use for the present and future welfare and enjoyment of all the people; (2) to make available to Americans in all walks of life a wider knowledge and appreciation of their forest resources and the part they can play in the social and industrial life of our nation.

The History MORE THAN half a century ago American men and women of vision, stirred by the rapid destruction of forests and forest life in the United States, began to raise their voices in behalf of conservation. Foreseeing the danger of allowing America's rich forests and vast natural wealth to be thoughtlessly wasted, these public-spirited individuals protested the needless destruction that was taking place. Out of their efforts came a collective force,—The American Forestry Association, first organized in 1875 and made a national influence in 1882.

The Record THUS The American Forestry Association has a long record of efficient public service. The establishment of the United States Forest Service and the creation of the nation-wide system of state and national forests and parks were due in no small part to the Association's efforts. Its educational work, extending over more than seventy years, has stimulated public action and built public support for protection against forest fires and floods; for prevention and control of soil erosion; for the development of conservation policies in forest management for continuous production through wise use; for the control of forest insects and diseases and the preservation of fish and wildlife.

The Support FROM AN ORGANIZATION of a few hundred members three decades ago, the Association has attained a substantial membership of many thousand men and women, living in every state in the Union and in foreign countries throughout the world. The funds of the Association are administered by a Board of Directors composed of individuals of national standing—men and women who give their services free, who have a practical understanding of the nation's present-day conservation needs, and are equipped through experience, ability, enthusiasm and training to advance the Association's program.

The Program BECAUSE OF its independent, non-political character, the work of The American Forestry Association is vitally necessary in the field of public service. It provides an unprejudiced influence for the development of sound conservation measures. It helps coordinate public, state and federal policies. It cooperates closely with federal, state and private agencies in conservation work. At the same time it initiates, sponsors and carries on needed projects in conservation in addition to its regular broad continuous program of education.

MY FAVORITE TREE

By

EDNA FERBER

THERE'S no reason, really, why my name and my article should be included in this series. I haven't a favorite tree. I haven't a favorite flower. I haven't a favorite human being. I haven't a favorite food. I could name a dozen trees, people, foods, flowers that I like and admire. This tree I like for one quality, that for another. But I may dislike another quality in each of these. There are two willow trees at the west end of my swimming pool here in Connecticut. They look like verdant fountains, but the unfortunate thing about them is that they are. Their tiny spear-like leaves blow into the pool with every wind—and this is a windy hilltop. A swimming pool full of floating leaves isn't inviting.

The twin elms shading either end of the house are a blessing through the hot summer months but they're the first to shed their leaves and make rake-work a necessity in the early autumn. It's the same with people. I love this person in spite of her quick temper; that friend in spite of his indolence. The pin rock in the drive circle looks like a crisp prim head of lettuce and is as neat and tidy, but I wish it would relax a little.

Yet there is, perhaps, one tree (and when I say one I mean one tree, not one species of tree) that is, or was, my favorite. It was a gigantic and majestic silvery beech. For as many miles as I've traveled in Connecticut I've never seen a beech like it. They are not seen in this region (undoubtedly, this tree was an exotic—Editor's Note). No one knows how it came here. It must have been more than a century old. It stood towering at the edge of the woods overlooking the drive leading up to the house. Its shining silver shaft against the blue sky was a sight at which to marvel. Its upper branches were gnarled and vast. Its head massive and shaggy. Every now and then a tree expert, struck by its grandeur and rarity, would write and publish an article about it. It was invariably called a specimen tree.

Along came the Connecticut hurricane of 1938, the year in which this house was built and finished. No tree of the many that had been planted on this place was damaged. But one great arm of the beech was torn from the body of the tree. Two years later an unprecedented ice storm in March caused another branch to break under the added tonnage of weight. The final blow came with the summer hurricane of 1944. The gigantic structure, leaning so precariously at the edge of the woody slope, crashed under the ferocious blows of the wind. The hurricane had come exactly according to the weather department's warning, at 11 o'clock at night. Next morning, confronted by a ravaged landscape, I ignored everything else to inquire, "The beech! The silver beech! How about that?"

"It's down. Gone. Done for."

I had lost a friend. I had lost a companion. I had lost my favorite tree.

THE FOREST EXCHANGE . . .

Concerning Our New Format

SIR: I am particularly impressed with the high quality and general attractiveness of make-up and art work in the January issue. I hope you will be able to keep up these standards of layout and content, since they are obviously the most important step toward building up the prestige and extending the reader sphere of a magazine of this kind—*Milton A. Smith*, Chamber of Commerce of the United States, Washington, D. C.

SIR: The January issue in its new dress is most attractive. I want to commend you and the whole staff on its appearance.—*Henry Clepper*, Executive Secretary, Society of American Foresters.

SIR: The sprightly and dashing manner — forceful, too — in which AMERICAN FORESTS this month (January) tells the forest story is a pleasure to see, and I want to offer my congratulations. As I see it, this is more than a change in format. It is the result of a determination on your part to speak out more boldly and more effectively for the forests. From my own experience I know that the things you have done in this issue cost money, and I am glad to see that the Association is willing to spend it. You will be able to compete successfully with other publications, in behalf of what you stand for in forestry.—*Floyd B. Quigg*, Editor and publisher of *Wood Industries*.

SIR: In general, I like the idea of modernizing the format of AMERICAN FORESTS. I do think, however, you are being over-cautious about the use of color. Splash it on—but don't make it all red. Green and brown are good forest colors. Your cover for January lacks punch. — *J. A. Boylan*, New York City.

To Stop Tree Destruction

SIR: I have planted some fir trees on the Ohio River Boulevard — 20 years back — 300 Lombardy poplars and later 200 ailanthus trees. Recently the state took charge of the boulevard and decided to make a new crossing. They cut out more than 20 of the largest, best grown of the trees. never mentioning it to me. I was so disgusted that I decided to become a life member of The American Forestry Association, hoping it will help control the destruction of trees over the country. I will not have time for many plantings, having passed my 90th birthday. I love trees and have planted many.—*Mrs. E. W. Pontefract*, Sewickley, Pennsylvania.

Conservation at Work

SIR: "Christmas Buck" in the December issue is a striking example of the kind of article I like to see published in AMERICAN FORESTS. It is a down-to-earth story of conservation work—real restoration of an important resource. We need more examples of how otherwise ordinary folks are actually doing something about their own problems and less preaching on the evils of the past.

It's an interesting demonstration in itself but, when told in Charlie Elliott's easy style, it becomes a moving picture of *people* on the go.

I wish that you would set up a promise card — or whatever brain-tickler system you have devised—for 1950 to ask him to write a sequel and tell the readers of AMERICAN FORESTS how Frank Corley and his co-workers proved out.—*Bob Monahan*, Palo Alto, California.

TO OUR READERS

Because of an unexpected delay in the delivery of paper to our print shop and other conditions beyond our control, the January issue of AMERICAN FORESTS was late in reaching you. Much to our regret, similar conditions may also delay the February issue. However, indications are that the present critical paper situation will improve sufficiently to permit a return to normal schedule in March.

—Editor

That's What They're For

SIR: The winter sports display in the January issue was great. I am an Army-trained skier and mean to take full advantage of national forest winter sports opportunities.—*J. T. Weber*, Denver, Colorado.

On Presenting "My Favorite Tree"

SIR: May I express the greatest admiration for your splendid magazine. My pupils in the physically handicapped department of the Santa Barbara Schools enjoy it very much.

The series of articles entitled "My Favorite Tree" has been beautifully expressed and full of interest but may I make a suggestion which impresses itself upon me each time I read the page? Would it not be more effective if opposite the letter there were a stunning photograph of the tree selected, and a quotation appropriate to that particular tree? —*Martha Furlong*, Santa Barbara, California.

Our Pleasure

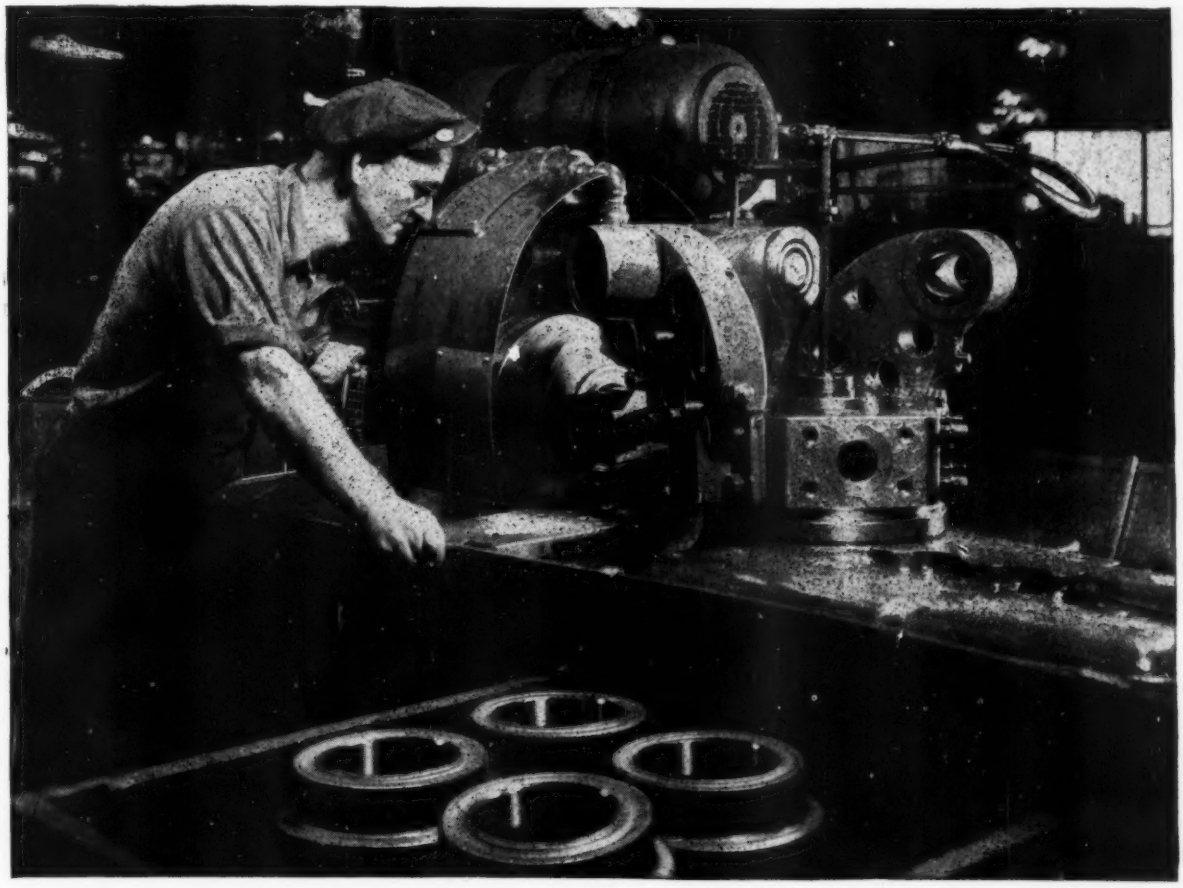
SIR: The District of Columbia extends to you its sincere appreciation for the cooperation of The American Forestry Association in the National Community Christmas Tree of 1945.

The beautiful program so generously donated by the Association has become a memento in thousands of homes, and we feel makes an important contribution to the success of the program.

The assistance of The American Forestry Association in this traditional program constitutes a relation which the Board hopes will be maintained through the years.—*Alice C. Hunter*, Secretary, Recreation Board, District of Columbia.

A Lesson in Botany

SIR: In "The Forest Exchange" for January, A. B. Dirnock of New London, Connecticut, takes Stewart Holbrook to task for stating that the hemlock looper (see "Loopers in the Big Timber" October issue) fattens "on the stuff that laid Socrates low." Poison hemlock in Old World literature is an "unbelliferous herb, *Conium maculatum*," Mr. Dirnock reminds Author Holbrook, "surely not *Tsuga canadensis*." Then he adds, "I think AMERICAN FORESTS should set a better standard of botany." So do I, but at the same time I think Mr. Dirnock should brush up on his own botany. Since when has *canadensis* been a big timber tree of the Pacific Northwest? — *C. H. Gaines*, Washington, D. C.



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DE-NAZIFIED FORESTRY

A firsthand report on what is happening to German forests in the American zone of occupation

By A. G. HALL

IS it true that the U. S. Armed Forces are depleting the forests of Germany without regard to sound forest practice? Or, as some Americans believe, are the Nazi foresters sabotaging the efforts of ill-informed American forces to produce lumber and other forest products?

These were some of the questions put to an army officer recently returned from Germany, where he had been supervising forestry activities in the American zone of occupation. This officer had been with an infantry unit attached to the Third Army and later to the First Army. He had fought his way into Europe. Because he was a forester, he was assigned, following V-E Day, to the task of forest products production.

Here is a brief history of forestry operations in the American zone of occupation, as related by the officer:

Following the cessation of hostilities, the tactical units of the Army already in the forested areas immediately organized skeleton forestry departments, setting into operation forestry and trade practices in accordance with those carried on in prewar Germany. German civilian foresters and technicians assisted in this work. By October 9, a quadripartite forestry subcommittee had been organized to correlate forestry practice within each of the occupied zones of Germany.

At the present time, there are three military government regions in the American zone: Bavaria, Greater Hessen, and Wuerttemberg-Baden. In each of these regions, responsible to the Office of Military Government in Berlin, is a forestry staff, headed by an American forester of the U. S. Army. The forester's chief job is to see that his area produces its portion of the forest products harvest to meet approved requirements in accordance with sound forestry practices. The forestry practiced is German forestry. And here is how it works out:

In each region there is a German civilian forestry section, which works under the direction of the military government. The forester in the German civilian section takes his orders from the American Army forester, as to the kind and amount of material which must be produced in a given time. Within the limits of quantity, quality and time, the German forester may practice all the forestry he wants.

The German forester attached to the German civilian section in Greater Hessen is Dr. Carl A. Schenck, founder of the old Biltmore Forest School in North Carolina. Dr. Schenck is nearing 80 years old, but is still active, and one can assume still practicing the brand of good forestry for which he and his fellow German foresters are noted.

The program is being delayed to an extent. But the delay is occasioned by the small number of foresters available, rather than through any attempts to sabotage the program. In prewar and wartime Germany, forestry was headed up by Herman Goering. Consequently, those foresters who held positions in the Reich had to be Nazi party members. In its de-Nazification of the forester ranks, it became necessary for the military government to screen out from 68 to 95 percent of the otherwise qualified foresters in the various areas. Thus, there are few German foresters available for marking, cutting and logging supervision.

Other delaying factors are lack of manpower to perform the woods and mill work, and inadequate transportation facilities. Woods labor is just 50 percent of the prewar level and bridges and rail lines still show the effects of the war.

In spite of factors tending to retard production, it has been possible for the U. S. Army to meet redeployment needs for lumber, to keep lumber from being the bottleneck item in civilian construction needs, and to provide exports (inter-zonal trade), principally of pit props to the British occupation zone.

What about productive capacity? There are about 4,500 sawmills in the American zone of which some 1,500 were in operation on October 31. Initially, sawmills were operated by combat units of the engineers, and later by civilians under Army supervision. Now, the Army is supervising the operation of a small number of mills to help meet military requirements. All the rest have been released to civilians, under a general policy to revive the prewar civilian trade organizations under the control of military government officials. From a production of 74 thousand cubic meters (31,450,000 board feet) in July, output of the sawmills had increased to 131 thousand cubic meters in November. It is expected to increase still more in 1946.

Special problems were encountered in the production of pit props for the coal mines of the Ruhr Valley, in the British zone. In order to meet the emergency which arose last July, U. S. troops, German prisoners of war and civilians produced and shipped pit props without regard to normal trade practice. Later, however, pit prop production was put in the hands of German civilian dealers. By the end of November, the German dealers were handling most of the requirements.

Wood of all types is under strict allocation control. This applies to logs, pit props, pulpwood and fuelwood, as well as sawn products. In a manner somewhat similar to the control programs exercised in this country during the war, requirements are submitted for both military and civilian needs. These are screened by a reviewing group, and the production departments work to produce the approved requirements.

What is this doing to the German forests? The total area of the Rumpf-Reich (occupied Germany west of the Oder River) is estimated to be 35 million hectares (86,450,000 acres), of which about 10 million is in forest land. (All estimates of area, forest stand, increment and cut are those of German forest economists, and should be recognized as such until more accurate surveys are completed under military government supervision.) Excluding forest openings and burned areas, there are 9,500,000 hectares

(*Turn to page* 96)

Let your HEAD take you

(The average American today has a choice of just going where "his feet take him", or choosing wisely the course to follow. Let's skip ahead 10 years, and take a look at John Jones—and listen to him . . .)

"SOMETIMES I feel so good it almost scares me.

"This house—I wouldn't swap a shingle off its roof for any other house on earth. This little valley, with the pond down in the hollow at the back, is the spot I like best in all the world.

"And they're mine. I own 'em. Nobody can take 'em away from me.

"I've got a little money coming in, regularly. Not much—but enough. And I tell you, when you can go to bed every night with nothing on your mind except the fun you're going to have tomorrow—that's as near Heaven as man gets on this earth!

"It wasn't always so.

"Back in '46—that was right after the war and sometimes the going wasn't too easy—I needed cash. Taxes were tough, and then Ellen got sick. Like almost everybody else, I was buying Bonds through the Payroll Plan—and I figured on cashing some of them in. But sick as she was, it was Ellen who talked me out of it.

" 'Don't do it, John!' she said. 'Please don't! For the first time in our lives, we're really saving money. It's wonderful to know that every single payday we have more money put aside! John, if we can only keep up this saving, think what it can mean! Maybe someday you won't have to work. Maybe we can own a home. And oh, how good it would feel to know that we need never worry about money when we're old!'

"Well, even after she got better, I stayed away from the weekly poker game—quit dropping a little cash at the hot spots now and then—gave up some of the things a man feels he has a right to. We didn't have as much fun for a while but we paid our taxes and the doctor and—we didn't touch the Bonds.

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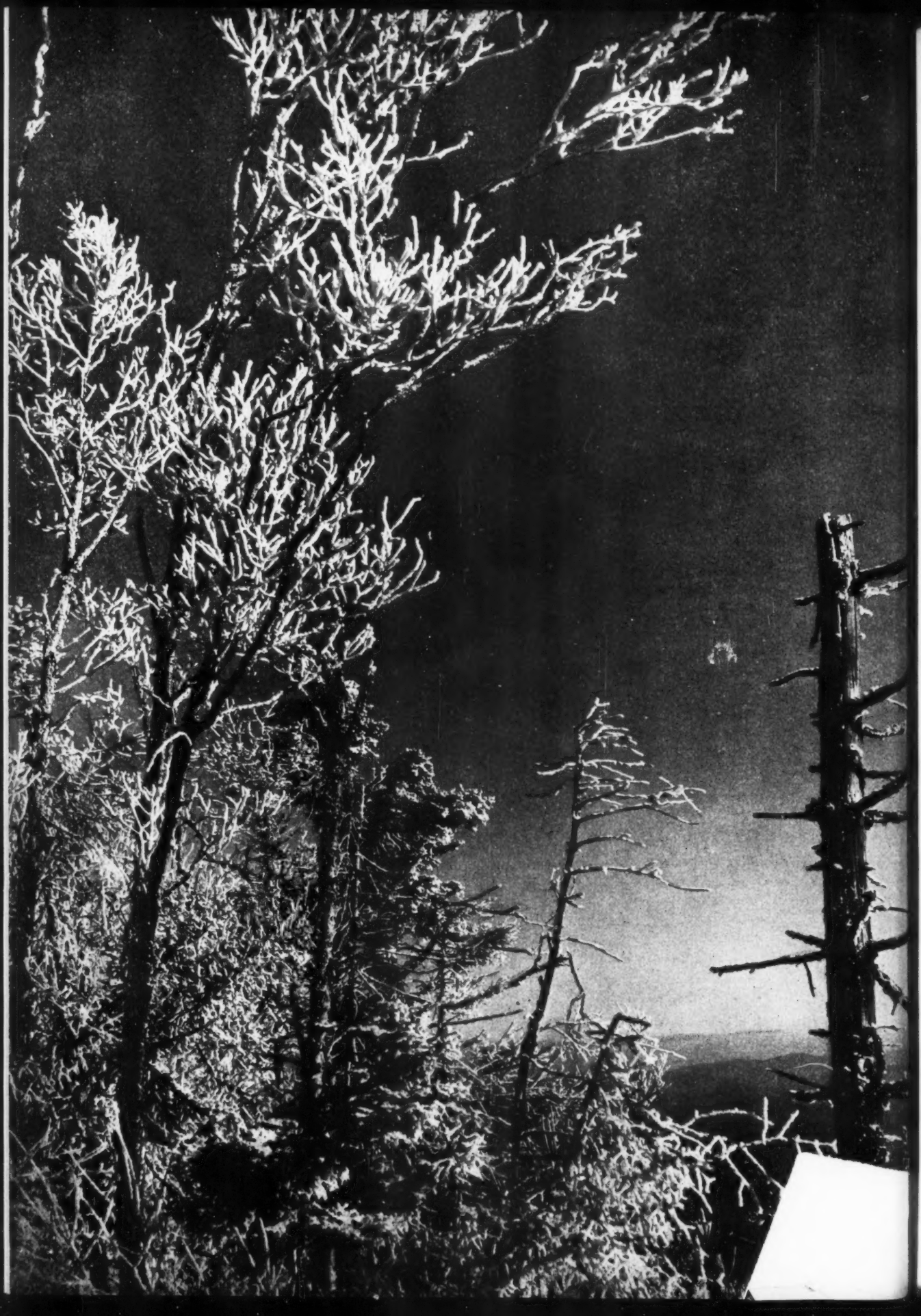


Editorial

The Future of Big Timber

FROM earliest settlement days America has obtained its supply of high quality lumber from big tree forests. It continues to do so even though the frontier of big timber has been pushed back to limited areas. Many students of forest trends and futures have accepted as inevitable the conclusion that this country's days of high quality lumber are numbered. They hold that when our fast receding supply of trees which have become big through hundreds of years of undisturbed growth is gone, industries peculiarly dependent on high quality wood will either have to go out of business or use expensively fabricated and not always satisfactory substitutes.

To this theory Burt P. Kirkland, a member of the Forest Resource Appraisal staff of The American Forestry Association, does not subscribe, particularly as applied to forests of the Pacific Coast states which contain the last sizeable reservoir of big timber remaining in the United States. In this issue ("Let's Grow Big Timber Too," page 68) he outlines a plan of management adaptable to the faster growing trees of our western forests which if widely applied will yield a continuous supply of high quality wood as well as common lumber, pulpwood and fuel. Mr. Kirkland is well equipped to deal with this important question. He is a professional forester of almost 40 years' experience, much of which has been in the big timber country of the Pacific Northwest. As a member of the Association's appraisal staff he has had opportunity during the past two years to appraise Pacific Coast forests in the light of wartime cutting and current conditions.

Considering the fact that the whole country is so heavily dependent on western forests for its future supply of quality wood, Mr. Kirkland's conclusions demand attention in the consideration of a long-range national forest policy. They are of special moment to the Pacific Coast states upon which national attention must now inevitably be focused. The war has worked wonders of industrial development there. The future promises continuation of industrial enterprises of great magnitude, and to this the region's forests must contribute. An important question is whether these forests, already taxed by demands from elsewhere in America and abroad, will be so managed as to supply wood of high quality in ever-increasing quantities, or be permitted to sink into the pitiable mediocrity of many other formerly splendid woodlands of the eastern part of the United States.

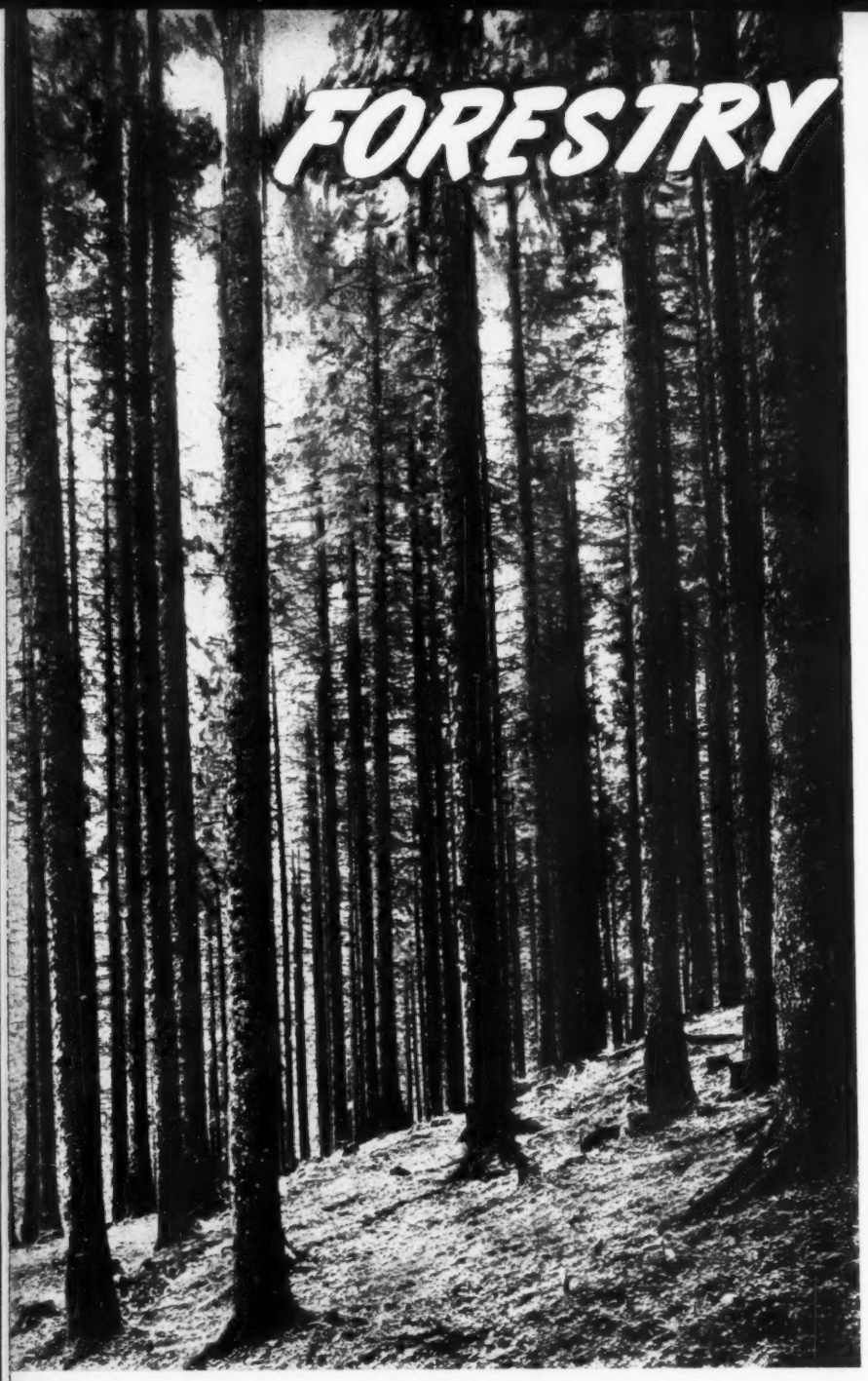
Commercial timber operations began on the Pacific Coast only about a century ago. In the years since, tremendous numbers of fine trees have been felled and their products have gone to all parts of the world. Wherever timber has been cut there has been tremendous waste, as anyone knows who has ever visited a western logging operation. What may be less well known, there has also been waste in the forests that have not been cut, far greater in the aggregate probably for each forest acre than the waste in logging resulting from material broken in felling or discarded because of defects or non-merchantability. It is estimated that in the Douglasfir stands of the Pacific Northwest, for example, the average annual loss by reason of starvation in young trees and decay in old is at least 300 board feet upon every acre.

Mr. Kirkland declares that attainment of sustained yield management in old growth stands by leaving them untouched is an extremely wasteful process. Thus he admonishes the federal government, the states, timber companies and individuals, all who own or administer forest lands, to stop the waste that has been going on all these years and by long-range management to increase tremendously the yield of wood from their forests. Of course, in order to have such management, owners must be willing to continue owning their lands. They must be willing to invest in permanent roads and to provide for long-time financing, with the promise, however, that these costs will be more than paid for by increased productivity and by the returns which annually will flow from products of higher quality.

Another eventuality toward which this discussion points is that the allowable cut of timber from the forests of the Pacific Coast actually may be far greater than has been believed possible. Given the kind of management which well trained American foresters ought to provide, the yearly cut need not decline. There need not be any shut-down of timber production to provide two decades or three of badly needed rest for the forest. This is a fascinating, and to some a revolutionary idea, which Mr. Kirkland will discuss in a second and concluding article to be published soon.

"Adirondack Ice Crystals"—a frozen hilltop captured by John H. Cornwall III at Gore Mountain, North River, New York

FORESTRY IS BIG IN



By A. C. CLINE

The author, chief of the program section of the Lumber and Lumber Products Branch of the Civilian Production Administration, recently completed a study of Austrian forests and forest industry conditions to guide the future activities of the U. S. Military Government and the staff of the U. S. Embassy in Vienna.

AUSTRIA is of interest to American forest owners and conservationists because of her long experience in forest resource development and the attainment of a relatively stable forest economy. To be sure, the conditions which have brought this about do not exist in the United States to more than a partial degree, but with a diminishing supply of commercial timber in this country—and in the world—it may be assumed that the development of our own forests will more or less follow the same general course as that in the European countries.

Before entering upon an analysis of forest conditions in Austria, some of the more striking differences between the two countries should be mentioned. Austria is a small country—about the size of South Carolina—having a large part of its land area in high, rugged mountains and steep foothills where topography, soil and climate limit crop production to trees. The Alps stretch across the entire country from Switzerland through the western and south central portions to near the eastern boundary south of the Danube. The higher central ranges of the Alps extend up to from 10 to 12 thousand feet. North of the Danube there is another mountain region, the Bohmerwald, along the boundary between Austria and Czechoslovakia, with elevations reaching 3,500 feet. Quantitatively, the area, growth, and product outturn of the Austrian forests is on the order of one-thirtieth to one-fiftieth that of the forests of the United States, and the per capita area about one-third as great. A wide variety of topography, soil and exposure within such a small area results in marked differences in the composition and treatment of the Austrian forests, adding much to their demonstrational value for visiting Americans.

I recall a remark made by an American in Vienna that "all Austria has to sell is scenery and timber."

BUSINESS - AUSTRIA

There is a great deal of truth in this statement, and it is the high degree of dependence upon forest resources which makes a study of economic conditions in that former Axis nation of interest to economists as well as foresters. It was Austria's timber exports which after World War I enabled her to import food, prevent starvation and put a foundation under her shilling currency. Will the forests again be able to come to her rescue? Light may be thrown upon this question by considering the various factors which have contributed to the high level of economic stability attained in Austria in the past.

Like many other countries, Austria did not institute a comprehensive code of forest laws until her forests were seriously depleted. Following many years of forest abuse, laws were promulgated by Franz Joseph I in 1852, and these continued essentially unchanged until the Anschluss, in 1938, when the Austrian forest laws were replaced by German laws. It is expected, however, that the original laws will be largely restored.

All forest owners are required to conform with sound forestry practices and to open their forest operations to inspection by public forestry officials. The larger forest estates must be operated under working plans approved by the state. Small private owners must report all intended cutting, except for home use, to the district forest office, which is charged with the responsibility for supervising operations on such property. No forest area may be used for any other purpose without permission of the public authorities. If the forest has been used for another purpose, the owner is subject to a fine, besides which the area must be reforested at the owner's expense.

In state and community forests, cutting areas must be restocked by planting, if necessary, within five years following cutting. In the case of private owners a longer delay may be allowed. No forest may be so treated that the growing of trees will become impossible or endangered in the future. No forest may be so treated that adjoining forests will be damaged by the wind. Where clear cutting would create such a hazard, uncut strips 37 meters (121 feet) wide must be left to protect adjoining stands. Where the soil is subject to erosion and on high, steep slopes, only extremely conservative cutting is permitted. No domestic livestock is permitted to graze where young trees would be destroyed. If special measures seem necessary to protect persons or property against avalanches or landslides, such measures can be ordered by the state. The more

Scenery and well managed forests are among Austria's leading assets

important forests (size to be fixed by provincial foresters) must be managed by experts who have been examined and accredited by the state.

That such stringent forest laws should have remained in force and effectiveness so long is not only a testimonial to the wisdom of the advisers of Franz Joseph I and the amenability of the people to regulation by the state, but also a direct reflection of the great importance of the forests in the economy of the country—far exceeding that of our own forests in our domestic economy. A measure of this is seen in the extent of the Austrian export of wood products. Before the war, wood exports made up nearly one-half of the total tonnage of all exports from Austria, equalling nearly one-half of United States timber exports, and this with a total annual forest drain amounting to not more than three percent that of the United States. Furthermore, with a forest area of about one acre per capita, as compared with over three acres in this country, the pressure of the domestic demand on the supply has been considerably greater.

Under such relatively favorable conditions for the intensive practice of forestry—aside from the higher cost involved in high mountain logging and transportation—it is easy to see why a policy of sustained forest production is generally supported by all classes of people in Austria. It is easy to see, too, why there is general concern when overcutting is resorted to, as during the war, and the popular interest in restoring the forest growing stock to full productiveness as soon as possible.

I was told by Austrian officials that every man on the street understood the meaning and importance of sustained yield production and the maintenance of forest growing stocks. Certainly, this was true in the case of the citizens of Vienna who, despite a critical need for greatly increased cutting of fuelwood—as a substitute for coal—resisted vigorously through the public press and otherwise all efforts by the United States military government to put the needs of a suffering population above considerations of the effects overcutting might have on the future of the Vienna woods.

The high regard in which the forests are held by most European people cannot be appreciated by Americans until they have lived under European conditions and absorbed some of the background of history and tradition which is so much a part of the everyday life of every citizen. Despite the extreme cruelties perpetrated by the Nazis on human beings, it is evident that this spirit of wanton destruction did not generally extend to the forests and that Hitler's order to increase the cutting to a maximum of 50 percent above growth was issued only after a careful survey of needs, and then under the systematic and orderly procedure for which the German people are so well known.

Actually, in Austria, this degree of overcutting was reached in only one of the war years. In total, it is now believed that the overcuts during the entire war period will not exceed the equivalent of two and one-half years growth. And a similar result probably will be found in the case of Germany. So firmly ingrained are the principles of forest conservation in the public mind and so confirmed are the foresters, through years of training, in the concept of maintaining the full productiveness of the forests, that even a directive from the highest authority is resisted and evaded by every possible means. I was told that some foresters had juggled their growth and cut figures to show a "paper" performance which fell considerably short of the actual. And the conservatism of the Austrian foresters in marking trees in the American zone in the Vienna woods, notwithstanding a dire need of the people for fuelwood, was a matter of personal observation.

At this point, it seems of interest to bring out the difference between the policies of the United States and Austria in meeting national emergency needs for timber and other forest products, though forest conditions in the two cases, as already pointed out, are hardly comparable. In this country, wartime timber production—the responsibility of the War Production Board—was promoted with little official regard for its consequences in relation to the future productiveness of the forests or the husbanding of kinds or qualities of timber in possible short supply, the lack of which might have serious results in a future emergency. One might question the wisdom of so much emphasis being placed on production and so little, comparatively, on the regulation of distribution and the limitation of use.

The forest ownership pattern in Austria differs considerably from that of the United States. Contrary to expectations, only 15 percent was found to be owned by the state, as compared with over 20 percent in this country. Provincial, district and community forests account for around nine percent; public funds slightly more than one-half of one percent; prebends and institutions of the church four percent; cooperatives and associations four and one-half percent; entailed property six percent; other private forest property 61 percent.

The smallest-size holding, under 100 hectares (247 acres), predominates in every province except Salzburg, and the total representation of this class of ownership is 44 percent. Many of the smaller holdings are farm woodlots, and it is on these holdings, as in America, that one finds the poorest forestry practices. Where forest and mountain pasture management has been conservative, the farms are permanent and have been cultivated for generations. Permanency of tenure and care is encouraged by a law which regards the agricultural holding as one permanent unit which cannot be split and parcelled among descendants of the owner.

Some of the classes of ownership may be new to American readers. "Public funds" refers to property administered by the state, the income from which is used for charitable purposes. For example, some property formerly owned by the emperor was expropriated in 1918 and the income thereafter used for the benefit of crippled World War I veterans. The term "prebend" refers to forest property owned by the church (monasteries, bishoprics, parishes, etc.). the income from which is used to pay the wages of clergymen. "Entailed property" refers to cases where the owner of a forest estate has only the usufruct of his property. He is not permitted to sell the whole estate or part of it; he must leave it intact to his heirs, upon whom the same entailment is binding.

Although the demand for forest products is much greater in relation to the supply than in the United States, and hence prices relatively higher, this advantage is offset to some extent by high extraction and transportation costs associated with timber production in mountainous regions. This places a special burden on foresters and forest ownership in order that Austrian timber products may successfully compete with such materials produced in less mountainous countries within reach of the same markets. Austrian forests are also burdened with many rights, or thralldoms, of long standing under which the authorized persons may

cut and remove wood for their own needs at a minimum charge. Forestry practices, therefore, have been developed under conditions which demand careful and judicious expenditures.

Silvicultural practice is much more intensive in Austria than in the United States, and Austrian foresters are generally better trained and more experienced in the art of growing tree crops. Forestry is fully recognized and respected as a profession. Even those persons filling the secondary positions, such as forest rangers, are required to spend one to two years of practical training in the forest before going to the state ranger school, pass the lower state examination for forestry, and then spend two additional years of apprenticeship before being given the full responsibility of the position. Similarly, all foresters holding the higher administrative positions must be graduates of the high school for ground culture in Vienna, equivalent to the course offered in a forestry college in the United States, and must have passed the higher state examination for foresters.

I mention these requirements by way of explaining part of the difference between the general run of Austrian and American foresters—a contrast commented upon by American officers in the military government whose work brings them in contact with the Austrians. I recall one American lieutenant saying to his superior officer, "Why, Major, over here forestry is a profession!" Of course, there are professional foresters in this country, but comparatively few are actual practitioners of silviculture.

The Austrian forests, though they contain relatively few species—chiefly Norway spruce (58 percent of the total forest composition), Scotch pine, beech, silver fir, larch and oak —present a wide range in growing conditions which calls for various methods of handling. All of the well-known silvicultural systems are employed to some degree. Although clear-cutting is in most common use, it is applied very conservatively, beginning with a narrow strip which is gradually widened over a period of years, or as rapidly as satisfactory reproduction is established on the cutting area. Much of the overcutting during the war years took the form of too rapid extension of the cleared strips, thereby placing more dependence upon planting and increasing the hazard of erosion. Ordinarily, reproduction is secured in a considerable part by natural seeding, from seed trees along the windward side of the clearing, the deficit in new stocking being made up through resort to plantings.

In general, forest management may be considered in three categories, all related to elevation and accessibility. In the protection zone, which comprises chiefly the forests on steep slopes subject to avalanches and landslides, only conservative selection cutting or very narrow strips is permitted. Owners must conform with the law requiring maintenance of the protective value of the forest cover and are subject to a fine if the forestry officers determine that there has been excessive cutting. In the intermediate, or second zone, between the protection zone and the zone of lowlands and gently sloping hills, clear-cutting in strips is the prevalent method. This is largely the result of location on mountain slopes far from markets, where selective cutting would be both uneconomical commercially and difficult silviculturally. In the lowest, or third zone, where logging is less costly and markets are nearer, the selection and shelterwood systems are commonly used.

The selection system is applied to all-aged stands by the periodic removal of single trees (uniform selection) or groups (group selection), leaving the remaining middle-aged and younger trees standing for continued growth. Selection cuttings can thus be made in the same stand indefinitely, as long as the quantity removed is not greater than the growth added between cuttings, and are especially well-adapted to small farm woodlots where the owner requires a variety of readily accessible wood products, including fuelwood, from year to year. The shelterwood system is applied to even-aged stands and results in succeeding even-aged stands. It differs from clear-cutting in that the new stand is established under the shelter of the parent stand —which is heavily thinned to encourage natural reproduction; then, when the seedlings are well-rooted, the parent stand is completely removed. A stand may be treated uniformly (uniform shelterwood), or it may be

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Practices to secure regeneration and maintain growing stock are in common use. Forest owners must conform with sound forestry methods

The first section of the mural depicts the fabulous era of the timber barons and Paul Bunyan

THE EPIC OF *Minnesota's Forests*

By JOSEPH H. STOECKELER

A MURAL, "The Epic of Minnesota's Great Forests," was recently completed at the University of Minnesota by Hazel T. Stoick, instructor in art. The painting, 10 by 45 feet, is located on the corridor wall facing the entrance to the ground floor of Green Hall, the forestry building on the University Farm campus in St. Paul.

Due to the vision of Dean Henry Schmitz, this is one of the pioneer efforts in which the services of an artist have been utilized to provide architectural decoration for a college forestry building—to portray the empire-building contribution of a state's forests and their exploitation to propagandize the role of conservation.

In brief, the mural presents a graphic history of the forests of Minnesota from the period of primeval wilderness, through the long and devastating cycle of exploitation and forest fires to the relatively modern era of conservation.

The mural is divided into five sections which appear in chronological sequence from left to right.

The first section symbolically depicts the Indian bartering away to the white man huge areas of stately white pine forests. In this scene a tall Indian, in ceremonial dress, stands over a table at which is seated a malevolent-looking character who represents the worst element of the timber barons. The latter is grasping, with avaricious hand, the base of a large white pine—the green gold of a forest empire. On the table are the X-marked documents involved in the land transfer—knives, beads, and the inevitable jug of "fire water."

The second part of the mural portrays the era of logging. The scene is dominated by the massive bearded figure of Paul Bunyan, decked out gaily in a red plaid shirt. He grasps a huge saw which is bent double as it cuts down an entire swath of pine trees. In a lower register of the same part of the mural is Paul's blue ox, Babe, straining mightily on a taut chain wrapped around an entire section of snow-clad pines. The legendary Paul and his famous blue ox were used very effectively by the artist to emphasize the scope and magnitude of the old-time logging, which caused the virtual disappearance of Minnesota's once extensive stands of virgin white pine.

In the center of the mural is portrayed the transportation and milling of logs. The log-driving scene is dominated by the 10-foot-high figure of a muscular riverman lunging with peavy at the key log in a jam wedged in the swirling waters of a river.

To the right is a replica of an early Minnesota mill with many calk-booted figures in the millpond busily feed-

Here—an early white pine mill, the disastrous Hinckley fire of 1894, and the coming of forest conservation

ing logs to the jackchains. The activities in the interior of the mill are depicted by a sawyer directing the slabbing of a large log, and a millworker tugging on a cant with his pickaroon.

Forest fires, the inevitable aftermath of extensive logging and slash areas, follow in the next section. Here the artist selected a real person from history as the central figure. It depicts engineer-hero Jim Root driving his locomotive through smoke and sheets of yellow and red flame to rescue several hundred people from the disastrous Hinckley fire of 1894. Blackened fire-scarred snags and a vignette of the burning village complete the fire scene.

The fifth and final section of the mural tells the story of forest conservation in Minnesota. It shows General C. C. Andrews, the pioneer prophet of conservation in this state, reading his proposed forest conservation bill before the state legislature at the turn of the century. Surrounding him are the results of a planned program of conservation—a lookout on vigilant watch for tell-tale wisps of smoke, a forester marking a stand for partial cutting, and Civilian Conservation Corps boys planting pine seedlings on cutover land.

The overall effect of the mural is one of grand turbulent action. Into the tapestry the artist has skillfully woven fabulous figures from American folklore, colorful heroes from Minnesota's history, and dramatic scenes of logging, milling, fire and conservation.

Miss Stoick paints with a bold vigorous style and in her mural has done a superb job of depicting the hurly-burly activity and the rugged vitality of the old logging days. The use of color enhances the realism and dramatic intensity of the mural and gives it a rich decorative effect.

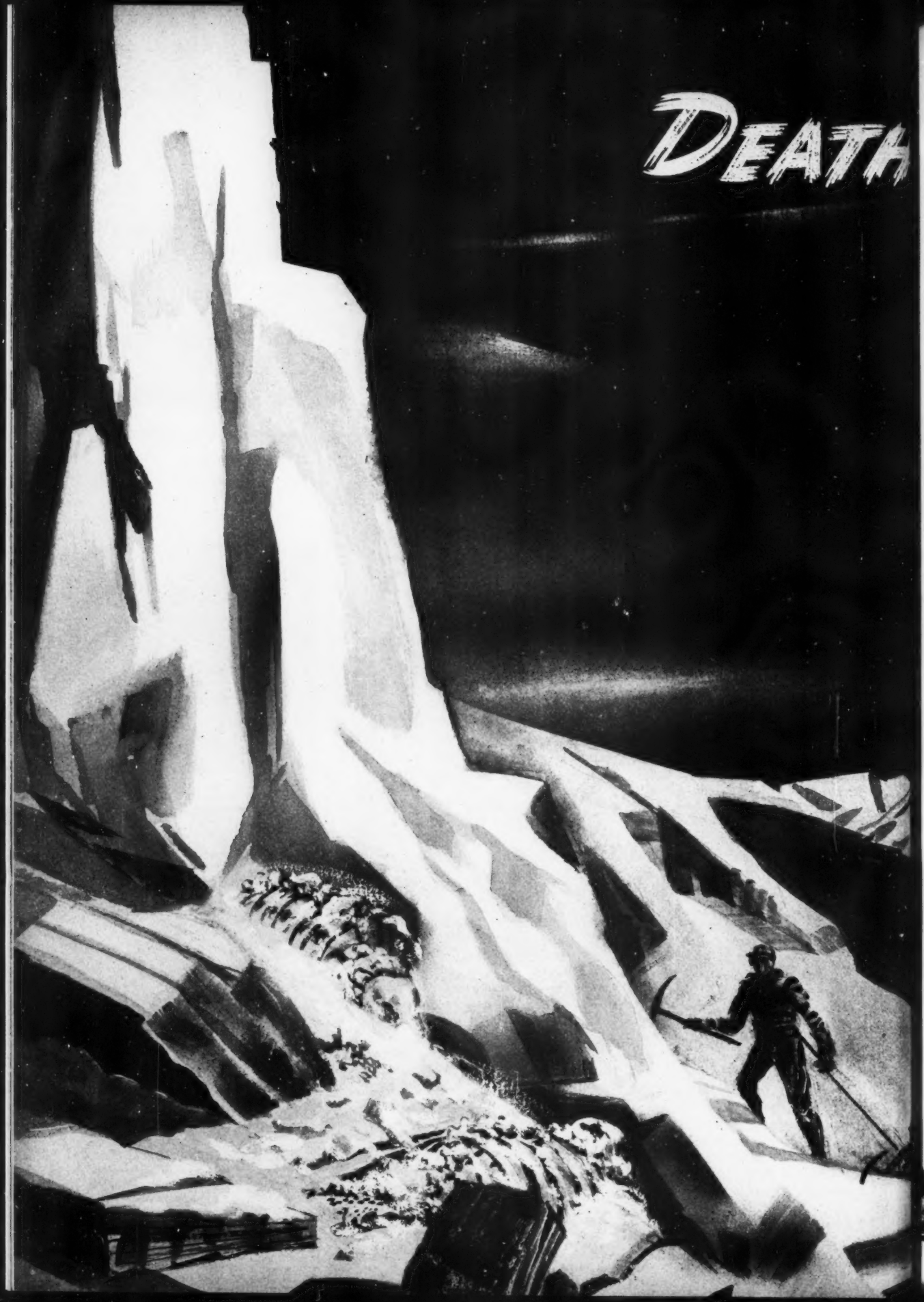
In preparation for designing and painting the mural, the artist first spent considerable time in the North Woods studying various phases of logging and milling operations and recording her observations by sketches and paintings. Then followed a period of historical research, which included personal interviews with loggers, millmen, historians and conservationists.

Next came the problem of organizing the material into mural form, and experimentation with painting techniques. Egg tempera was finally selected—the same medium used extensively by the masters of the Italian Renaissance.

Firsthand study of important murals in Mexico and the United States aided in giving the artist inspiration and furnished ideas on technique.

The mural project was initiated by Dr. Laurence Schmeckebier, professor of fine arts and chairman of that department. His encouragement was an important factor in the successful completion of the project.

The artist—Hazel T. Stoick


DEATH

IN THE WILDS

By RICHARD C. STONE

ONE of the most fascinating mysteries of the wild is the question as to what happens when animals and birds feel death upon them. What are their reactions, and where do they go to die?

Sometimes their bodies or skeletons are found in numbers, at other times alone. And sometimes it seems as if they seek the loneliness of the heights to spend their last moments in isolation.

Dr. Julian Huxley, the eminent scientist and zoologist, once recalled that a climber of the huge volcanic mass of Kilimanjaro, in Tanganyika Territory, East Africa, found a leopard corpse near its crater rim. That is, at an altitude of some 19,000 feet. Another climber corroborated his evidence.

More interesting still is the fact that this does not seem to be the only corpse the peak claims. The first climber of Kilimanjaro was Hans Meyer. He records that on his first attempt in 1887, when he reached what is now known as the Ratzel Glacier, he saw the dried remains of an antelope in one of the old glacier gullies.

The slopes of this majestic African volcano are clad with a forest belt, and the summits (there are two peaks) with glaciers. A game reserve has been declared on the lower slopes, and the instances quoted raise the absorbing question as to whether in some cases animals, knowing they are near their end, make for the heights.

If the Kilimanjaro instances were the only ones known there would be little upon which to base inferences, but as a matter of fact many similar cases have been reported from other parts of Africa and from places so widely separated as Norway and Malaya, Patagonia and the Antarctic.

A monkey corpse was found at Muhavura—13,500 feet—in the great Western Rift Valley of Africa, and another around 13,000 feet in the Cameroon Mountains of West Africa, amid bleak and lifeless surroundings. Sir Halford Mackinder, one of the most celebrated mountaineers of his time, found the skeleton of a buffalo on the moraine just below the snout of the Joseph Glacier, on Kenya Mountain, East Africa, at an elevation of 14,150 feet. That was in 1899; it was there 34 years later, and no doubt still is.

By coincidence, in the same year that Halford made his discovery, the first ascent by man was made of the Miendalstind in Norway by W. C. Slingsby. On the very summit he came across the skeleton of a mountain goat. In 1930 another mountaineer, remembering the story, climbed the same place and searched the summit rocks. He found in their crevices a number of goat bones, green with age.

Then, a year or two back, a sportsman in Negri Sembilan, Malaya, was out elephant hunting. He wounded a beast, but it escaped. Showing a humaneness commendable in a big game hunter, he felt that he must end its sufferings, and so he pursued it on foot. For six days he and his bearers made their way through the jungle, the tracks leading uphill all the way. When they eventually overtook the wounded animal it was high up, and lying down evidently awaiting the end.

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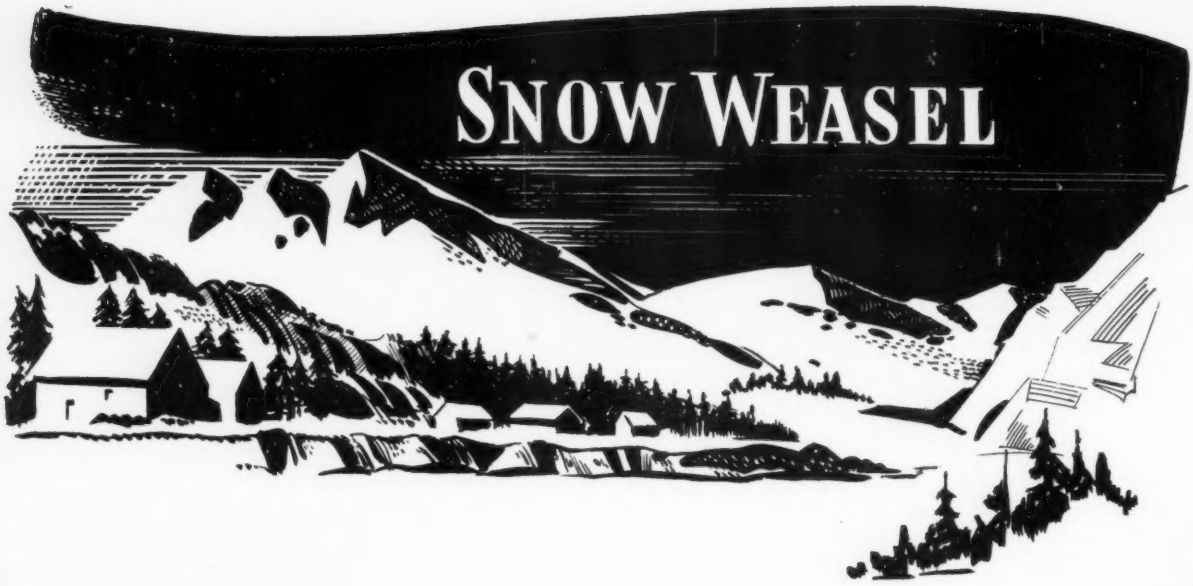
What happens when the creatures of the wild feel death upon them? Here are some interesting observations—and suppositions

SNOW WEASEL



Foresters put aside their snowshoes for the Army's midget T-15 cargo carrier

THE "snow weasel" has gone into the woods!

A cozy little two-passenger affair, originally designed for Alaskan combat, the Army's T-15 cargo carrier, called the "snow weasel," is the first war-born mechanism being tested for routine forestry tasks.

A pair of these snow cruisers has been purchased for use by the U. S. Forest Service. One, recently put through its paces for timber sale work, is at the Brush Creek ranger station, near Saratoga, Wyoming, on the Medicine Bow National Forest; the other has successfully completed trial tests on the Fraser experimental area, Arapaho National Forest, Colorado.

"It's a great thing, this weasel, for snow courses, game and rescue work," said John W. Spencer, U. S. regional forester at Denver. "Its adaptability to use on timber sales in long travel to and from marking areas, and on 'looking out' new areas has also been demonstrated in these proving tests."

Into the snow-bound forest on tracks of steel

As adapted to forest work, says Mr. Spencer, the weasel will get its most strenuous workout on snow courses. For example, at the Fraser experimental forest, in the headwaters of the Colorado River, intensive studies are under way to determine the influence of coniferous forests on water yields from the high watersheds of Colorado. The importance of these studies is based on the fact that a large share of the streamflow in the main range of the Rocky Mountains is derived from forest land, and on the possibility that the effectiveness of snow and rain in producing streamflow may be influenced by the type of cutting of the forest cover.

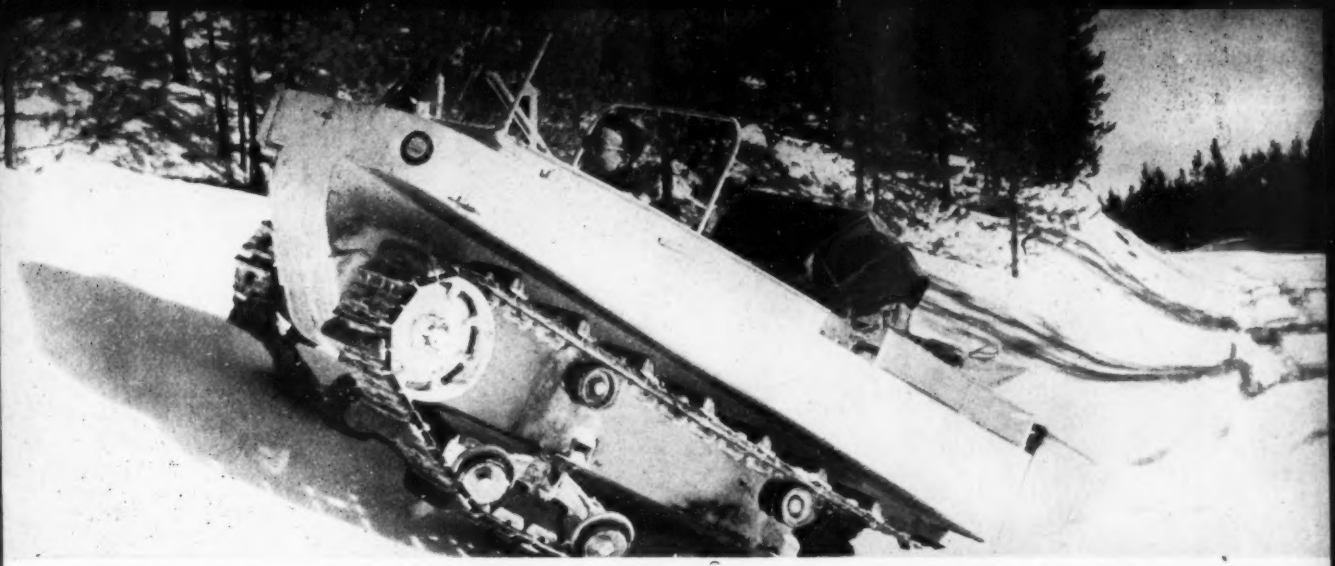
This series of experiments is largely concentrated in a group of plots established to determine the influence of several kinds and intensities of cutting on watershed conditions, as well as upon tree growths. For the study of snow storage, 500 points of measurement are located over the area. Travel between groups of these test plots is providing the weasel with plenty of action to determine the extent to which it is adapted to the work.

According to H. G. Wilm, expert in charge of forest influences at the Rocky Mountain Forest and Range Experimental Station, at Fort Collins, and one of the main test operators of the T-15: "The machine starts easily and runs smoothly. Under reasonably good conditions, it provides a rapid and convenient, though rather rough and noisy, means of transportation. Even under the worst conditions of deep, dry, powdery snow, the weasel beats walking or snowshoeing—especially when equipment is to be loaded in."

Paving its highway as it goes on rubber-soled steel tracks, this 12-foot long ton-and-a-half dynamic traveler operates on much the same principle as the crawler-type tractor. Equipped with miraculous brake control, it will turn in a 13-foot radius, will amble up a 45-degree grade and over a 19-inch vertical obstruction. It is capable of speeds of 24 miles an hour, and has a cruising range of 125 miles.

Most natural habitat of this mechanical weasel is snow—especially deep snow—but it likewise takes readily to water, floating in 44 inches. Under that depth, it will ford a river on its own power. Loaded to capacity—1,260 pounds—the weasel on its foot-and-a-half wide tracks sinks but a little over two inches in hard-packed snow and 18 in the lightest.

Where snow is the main obstacle, the value of the weasel rates high in forest work.



Operating on the principle of the crawler-type tractor, the weasel ambles up a 45-degree grade

The two-passenger carrier, designed for use in Alaska, is twelve feet long, can carry 1,200 pounds

Capable of a speed of twenty-four miles on hour, the weasel has a cruising range of 125 miles

Redwood stands such as this should continue to yield big trees

Let's grow big timber too!

By BURT P. KIRKLAND

TIME and favorable conditions of soil and water have provided the Pacific Coast states with the largest and finest forests of conifers to be found anywhere in the world. Because world supplies of big timber are diminishing, are increasing in value, proper management of these forests is the most important forest question facing the far western states —perhaps the country as a whole.

The question involves not one but a variety of species, all of which in favorable localities grow rapidly and to giant or near giant sizes. They include the sequoias, both the Bigtree of the southern Sierra and the Coast redwood in the belt from lower Oregon southward; sugar pine on the western slopes of the Sierra; Sitka spruce in the north Pacific fog belt; Douglasfir and western redcedar in the western part of Oregon, Washington and British Columbia. These are big timber forests of first rank.

Second to them but still big timber trees in many localities are western white pine in northern Idaho, western hemlock in coastal British Columbia. Puget Sound, Gray's Harbor and the Columbia river areas; Port Orford cedar in southwestern Oregon and ponderosa pine over a wide range in eastern Washington and Oregon and on both slopes of the California Sierra.

Nationwide and even worldwide distribution of lumber from the Pacific Coast was built upon the fine qualities of timber from these great trees. Most timbermen and, one regrets to say, most foresters take it for granted that as soon as the old-growth forests are liquidated production of these large sizes will cease. Yet without production of high quality wood certain industries cannot survive. And, no matter how badly it may be needed, such wood cannot be produced anywhere else.

All species of Pacific Coast big timber trees produce wood at a rapid rate between the ages of 40 and 100

A nationally known forest economist proposes that western foresters grow big timber for quality as well as small trees for bulk—that such management will increase the allowable annual cut

years. Annual growth rates up to 300 cubic feet or 2,000 board feet an acre are not uncommon. And good growth is maintained even to great ages and large size—Douglasfir 80 inches in diameter, for example, has been known to grow two inches larger in a decade. Unfortunately, however, these species have persistent branches and do not begin formation of clear wood before they are 80 or 90 years old. And even if knots were absent, most of the wood formed during the first 60 to 100 years is of coarse grain and lacking the quality of wood of more mature trees. Billions of feet of these smaller sizes have, during the history of the lumber industry, been left in logging and reduced to ashes by slash fires.

How the forest industries can make a quick transition from wasting all this material to becoming entirely dependent on it is yet to be explained. True, the pulp and paper industry is beginning to use it. Yet Forest Resource Appraisal reports indicate that marked developments in Pacific Coast forest industries, involving investment of much new capital, must occur before the vast potential production of the young stands can be used. Even so, it has been assumed that production of small size material should not exceed that normally cut with larger and better timber. If such conservative methods are not used, far-reaching industrial changes for the worse are unavoidable.

Our big timber supply can be perpetuated and with it the dependent industries already profitably established. In a broad sense there are only two prerequisites to such a program: willingness of forest owners to continue ownership of good timber, and flexibility in adapting timber management to current economic conditions.

It is unfortunate that in planning for continued production of big timber, American foresters and forest owners have failed to inform themselves concerning sound European practices developed, most notably, for forests of the valleys, mountain spurs and plateaus of the Alps. Despite language barriers the best practices are essentially the same in the five countries concerned with these forests. The species managed are principally European (Norway) spruce and silver fir, with some pine and larch, all of which may be classed with the Pacific Coast species of secondary size. In these European forests, timber is regularly grown to ages of 200 years or more, to diameters as large as 48 inches, and to annual yields closely approximating 1,000 board feet an acre.

With what may be termed selective management methods, the average felling age of the timber probably does not exceed 60 years. Only trees of exceptional vigor and quality are carried through cutting cycles to the maximum ages. The reason for this is that abundant regeneration provides many times the number of trees that can be left to grow to large size. Therefore, there is a continuous process of light selective cuttings made every three to ten years. Each tree that comes out is cut primarily for cultural reasons, to improve the lot of those which are left.

In Europe, first attention is given to trees reserved for future growth. They must be of good quality and vigor and have adequate but not excessive growing space. This means that maximum use of the site is continuous and maximum yields are inevitable. Trees removed in each cutting cycle are either surplus young and middle

Small trees are found among the large in the Douglasfir forest

aged trees, or older mature trees that can no longer qualify in vigor. A large tree, if vigorous, may remain through many cutting cycles because, without requiring so much growing space, it may be laying on more growth than a half dozen small trees. And of equal importance is the fact that 80 percent or more of its growth may be fine quality clear wood.

What, then, must be done if high quality wood production is to continue on the superior forest sites of our own Pacific Coast? There are three positive lines of action, each simple enough for any competent forester or owner to undertake: First, the old-growth timber supply must be perpetuated for 75 years or more if high level sustained yield is to be attained. Second, as a necessary phase of the development of young stands, heavy yields from thinning must be taken at least once each decade to age 90 or 100 years. At the time of each thinning, poorly stocked spots unlikely to grow quality timber should be clear-cut and regenerated, preferably about eight percent of the area each decade.

This process, if initiated between the ages of 30 and 40 years, will have, by age 100, clear cut and presumably regenerated at least half of the young stand areas under management, and will have taken repeated thinnings from all stands within these age limits. The total cut to age 90 to 100 should be equivalent to about 75 percent of the total growth during that period. The remaining 25 percent, valued during the early years at $2 to $3 a thousand board feet on the stump, is left to grow into trees confidently expected to have far greater future value.

All stands surviving these repeated thinnings and selective clear-cutting to age 90 to 100 years are of a choice character both on an area and individual tree basis. They now need "single tree" management or picking and choosing individual trees to harvest—the third line of action—which during each succeeding decade will utilize 15 to 20 percent of the stand volume on a given tract, continuing indefinitely to age 200 years and over, or until the veterans have been removed. In the meantime, young stands are developing on the same ground. The yield following age 100 should consist of about 20 percent of the highest log grades, increasing as time goes on to 50 percent or more.

In the course of conducting The American Forestry Association's Forest Resource Appraisal in California, Oregon and Washington, Regional Consultant Burt P. Kirkland, nationally known forest economist, has further developed his challenging proposals that western foresters can and should manage the public and private forests entrusted to them so as to produce, in the future, vast quantities not only of common wood but of high quality timber as well. He believes that European experience in certain comparable forests of the Old World points the way.

Possibly even more startling, Mr. Kirkland declares that such management, including particularly the systematic salvaging of timber now lost through starvation and decay, will provide a permanent annual cut from far western forests much larger than is now contemplated.

AMERICAN FORESTS presents these proposals, as Mr. Kirkland's own, in the belief that its readers, laymen as well as foresters, will find them interesting and provocative. A second article will follow in an early issue.—Editor.

Leaving old-growth stands untouched is an extremely wasteful process. Trees in such stands can be classified into three groups: vigorous trees making fair to good growth; trees making little growth but safe to keep in storage from one to three decades; and decadent trees that will be lost if not utilized in a few years. Probably 40 percent of most older Douglasfir stands are in the third class today and are nonproductive, silviculturally and financially.

The highly important element of successful forest utilization is a matter of road extension and reasonable skill in felling and skidding to avoid injury to the trees left. To avoid windfall, cutting should seldom exceed 15 to 20 percent of the stand volume in any five-year period. However, some trees will fall down, and full utilization can be assured by providing salvage crews to pick up windfalls and dying trees overlooked in regular cuttings. If these cuttings are not made, sustained yield will be reduced by the amount of timber lost.

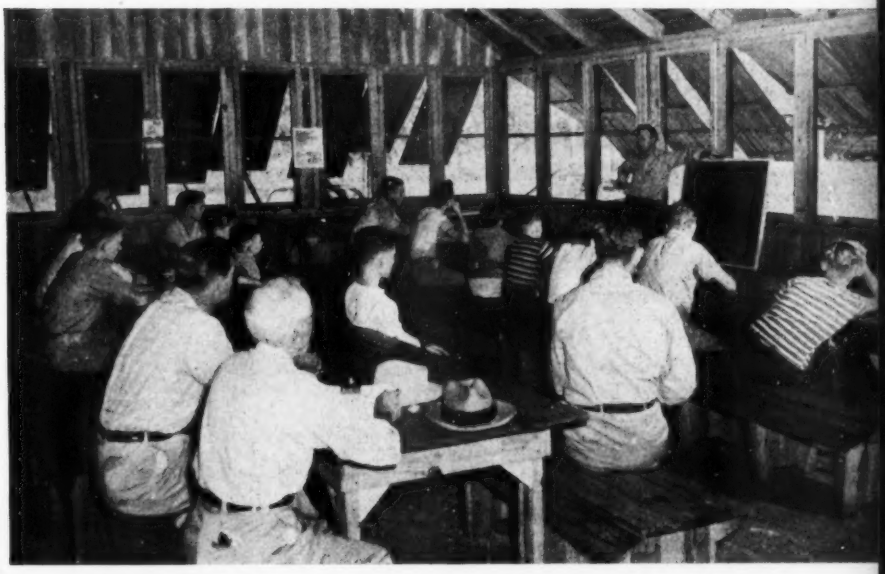
Private investors have been carrying extensive old-growth Pacific Coast forests for more than 50 years. Despite annual mortality losses of 300 to 500 board feet an acre, they have profited richly—much more so than short-sighted individuals who hastily liquidated their holdings on overburdened markets. These methods of timber investment have regularly burdened timber ownership with depletion charges of 20 to 30 million dollars a year in the Douglasfir region alone—valuing timber cut at the low rate of $3 a thousand board feet. In other words, cutting such timber

(*Turn to page* 91)

School in the Pines

Naval stores class being instructed in the use of the flat ax

Boys from Georgia's 4-H clubs attend first forestry camp sponsored by pulp and paper industry



An indoor session. Below, the boys learn to measure diameter

DOWN in Georgia, farm boys are going to school in the piney woods to learn how to manage their timber crop to the best advantage for continuous income. The boys are 4-H Club members who have demonstrated an active interest in forestry; the school is the forestry camp sponsored by the pulp and paper industry in the Laura S. Walker State Park, near Waycross.

A project of the Southern Pulpwood Conservation Association, the educational program covers all phases of proper forest management. Under a teaching staff provided by the Georgia Department of Forestry and the Georgia Agricultural Extension Service, the boys are taught how to control forest fires; collect pine cones, extract seed, and raise their own seedlings to be transplanted on idle or worn out farm land; estimate the value of their timber crop; and by actual training in the woods they acquire a broader knowledge of selecting and judging trees which should be cut for pulpwood, sawlogs, fuelwood, ties, veneer blocks, poles and piling.

The first seven-day class was held last August.

The HESSIAN DITCH

By JOHN D. KENDIG

Evidence of one of America's first prisoner-of-war projects—supplying water to a Colonial arsenal — still exists in Pennsylvania

The Hessian prisoners of war were quartered in this building

GERMAN prisoners of war have been used during the past several years in many parts of the country to help ease the shortage of labor. In Lancaster County, Pennsylvania, they have been used for farm work, the harvesting of apples, and the handling of tobacco in the big warehouses so typical of this section.

But this is not the first time enemy soldiers have been brought to Pennsylvania to be of local service. Historians record that on Christmas night, 1776, the Americans staged a surprise attack at Trenton, New Jersey, and captured about 1,000 Hessian soldiers. In August the following year a number of these prisoners were brought to work at Elizabeth Furnace, just north of the small village of Brickerville.

At that time the iron furnace there was busily engaged in making cannon, shot and other war materials for use of the colonial troops. The water-power needed to run the furnace came from a small stream that often proved inadequate. So it was decided to bring an additional flow of water from a larger stream, Saegeloch Creek, a little over a mile away. The Hessian prisoners were put to work digging the narrow winding waterway that is still known as the "Hessian Ditch."

The original blast furnace had been started about 1750 by John Jacob Huber. In the same year a young German named William Henry Stiegel, came to work in the business. Later he married Huber's daughter Elizabeth, and in 1756 acquired management of the furnace. He built the eastern part of the mansion, which is still standing, and about 25 tenant houses and a store. In 1776 Robert Coleman took over the property, including several thousand acres of woodland, and built a large and impressive addition to the mansion. He was evidently in charge when the Hessian prisoners were busy digging the long ditch.

Today, if you go back into the charmingly quiet Elizabeth Furnace country, it is like leaving the present and finding yourself lost in the history and times of busy years gone by. There is a picturesque lane leading downhill from the main road. It goes through brushy woodland, and here and there along the way are a few scattered stone houses and partial remains of the homes where the furnace workers once lived. Further on is the big stone mansion with its high iron fence, sloping lawn and towering old white pines, hemlocks and sycamores.

To the rear of the mansion rise the impressive terraced gardens, which at one time must have been a glory of colorful bloom. At the side of the gardens is a long, low stone building where the Hessian prisoners had been quartered. Down at the mansion, if you look in the right window, there is to be seen an old stove that was made in the furnace here and bears the inscription: "H. W. Stiegel Elizabeth Furnace 1769." Stiegel later became interested in making glassware, founded the nearby town of Manheim, and made the lovely and valuable Stiegel glass, which is so much sought after today.

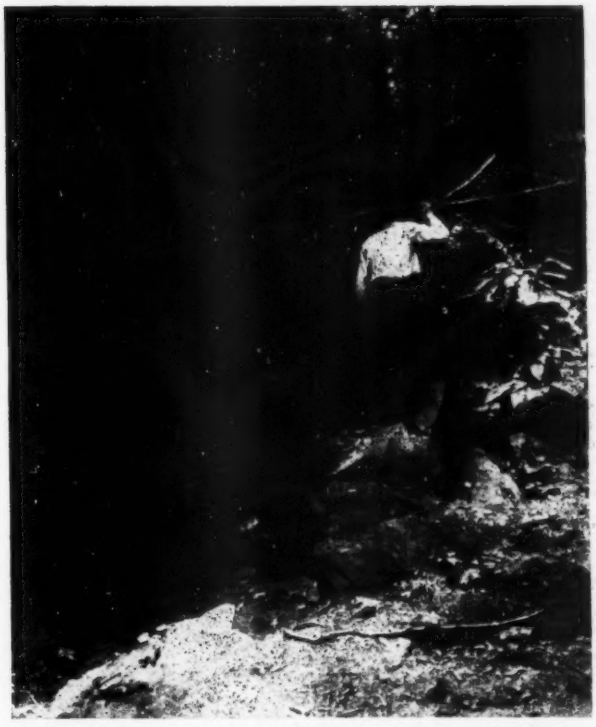
A narrow road leads down from the mansion and passes between rows of tall black locust trees. At the edge of the woods there is a path that winds over through old cleanings, now rapidly growing up into brush and trees. There, above an old tumbled down house, you will find the Hessian Ditch. At first it is only about two feet deep and four feet wide, but it picks up in size as you follow the towpath-like ridge that runs along the downhill side. It winds near the edges of open fields, is seen through a strip of scattered cedars and hardwoods, then gradually turns away into deeper woodland.

Nearby on the bank of the ditch are massive, gnarled dead chestnut trees that give a fair indication of the large timber once growing here. Some of these range from eight to over fourteen feet in circumference at breast height. There is a short-trunked spreading red cedar with a circumference of five feet, a red oak that is eleven feet, and a tuliptree that is nine feet—all right by the ditchside trail. Some of the oldest oaks and chestnuts were probably tiny seedlings or small trees when the Hessian prisoners bent over their picks and shovels, digging this narrow waterway along the side of Cannon Hill.

So the Hessian Ditch leads from old brush covered fields up through open cedar and hardwood stands into the thicker timber — tall stately tuliptrees and wide-spreading oaks, often with heavy understories of black birch and red maple with a scattering of beech, hemlock and scrubby yellow pines. It winds on around the hillside and cuts through deep rocky places, narrow and slit-like. In some sections it had been dug to a depth of six or eight feet, involving plenty of hard work when you realize that it was all done by hand labor.

The shrubby growth becomes heavier and there are dense thickets of laurel. Very little sunshine gets down through the leaves, and it is

The waterway, built by Hessian troops captured at Trenton in 1776, as it appears today



Where the picks and shovels of the early PW's cut into rock, often to a depth of from six to eight feet

often difficult to trace the line of the ditch for any great distance ahead. Frequently windfalls block the way and it is necessary to go out around old tangles, stumps and fallen trunks. The trail leads higher and higher and gradually winds around the hill into a narrow gap. After a while you are conscious of the sound of running water, and suddenly there is a break in the foliage, and there, down a steep slope and far below, is Saegeloch Creek. It is hard to realize then that this stream and the ditch you are following will meet at the same level farther up the gap. Now and then a woods road cuts through the bank of the ditch, and at a few places rocks have fallen into it. Otherwise its course is unbroken—right up to the level of Saegeloch Creek, where the embankments of an old dam can still be seen.

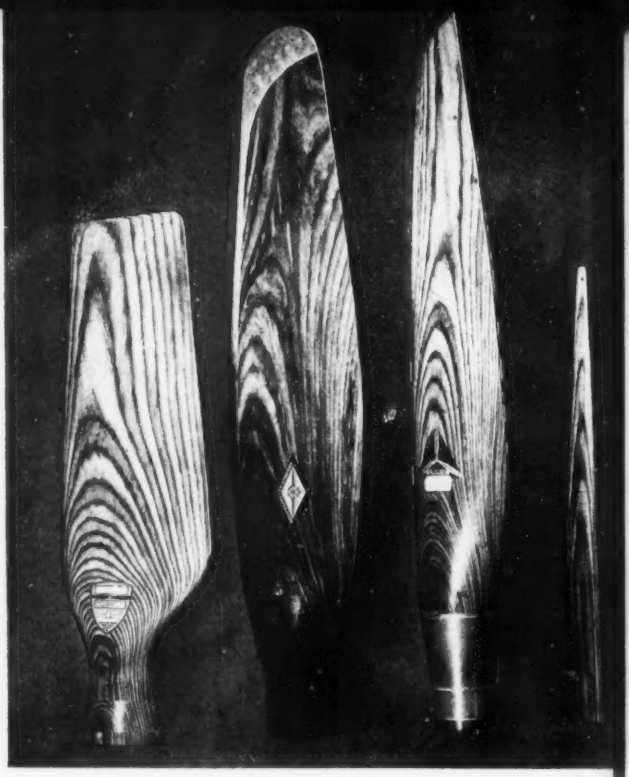
It is remarkable that this old waterway, constructed by Hessian prisoners back in 1777, can still be found and followed so easily. In the summer it is well hidden by heavy plant and tree foliage. At its very start there are wild roses and daisies, while farther in the woods there are many kinds of attractive ferns, ghostly Indian pipes, low coral fungi and spotted wintergreen. Fall sees the golden yellow of the birches and the tuliptrees, and the brilliant reds of the maples. A walk up the Hessian Ditch on a cool invigorating October day, when the sky is a deep blue and the woods aflame with the unmatched beauty of autumn, is one of the very best of experiences in this old world of ours. Then, more than ever, the Elizabeth Furnace country is especially colorful and inviting, and the Hessian Ditch comes into its own.

Use of prisoners of war on a project so directly concerned with the prosecution of the war as is described in Mr. Kendig's article would not have been permitted in World War II. The Geneva Convention which prohibits the employment of prisoners on military projects does, however, encourage their use in agriculture and other outdoor occupations of a non-hazardous type. Thus, in World War II, some 15,000 to 16,000 German prisoners were employed in this country in the less hazardous jobs in the harvesting of forest products. The peak of their activity was reached in 1945 when a total of 177,149 man-months of work was performed in the forest products industries, chiefly in pulpwood cutting. Similarly thousands more were employed in farm work to relieve manpower and food shortages.

The Timber Production War Project, a joint undertaking of the War Production Board and the United States Forest Service, devised special training procedures for teaching prisoners of war to use woods tools and equipment in the production of sawlogs and cordwood. Training outlines were prepared in English, German and Italian. Few Italian prisoners were put to work in the woods, however, after Italy was defeated and joined the anti-Axis forces.

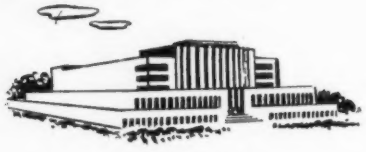
Employers utilizing prisoner-of-war labor were required to pay for it at the local going wage rates, the difference between the amount the employer paid and that received by the prisoner—generally a nominal sum such as 80 cents per day—going into the United States Treasury. In addition, employers were required to provide for housing and transportation of the prisoners if they were to be employed at any appreciable distance from the established security camps. Also, employers had to show that every attempt had been made to hire labor on the open market. In this manner, it was assured that prisoner-of-war labor would not compete in the labor market with free American labor.—EDITOR'S NOTE.)

Research at Madison provided the designs and techniques that built thousands of wood training planes



Aircraft engine test club, propellers, radio aerial mast made from compreg, resin-treated compressed wood

HOUSE OF WOOD MAGIC



PART TWO

The war achievements of the U.S. Forest Products Laboratory

By ERLE KAUFFMAN

Few Americans are aware of the part the U. S. Forest Products Laboratory played in the winning of the war. Now that the cloak of censorship has been removed, what transpired at this great forest products research center after Pearl Harbor can be told—is being told in this series of articles. In the January issue the laboratory's overall war program was reviewed and packaging established as its No. 1 war job.

ALTHOUGH the U. S. Forest Products Laboratory at Madison, Wisconsin, had by early 1943 solved the multitude of war packaging problems to the extent of slashing damage losses almost to the vanishing point and reducing by 20 percent the cargo space required to get war supplies from factory to the fighting fronts, there was no relaxation in packaging research. Indeed, up until the end of the war the men of Madison were working around the clock to improve packaging principles and methods. This was particularly true in the field of container designs for special items or purposes.

For example, when replacement demands for fragile airplane control surfaces — ailerons, elevators, rudders and stabilizers — mounted during the peak of aerial warfare, they developed blocking and bracing methods that delivered these critical parts to their destination undamaged and ready for use. The same thing was true of the extremely fragile, droppable fuel tank.

For the War Food Administration they produced a wet-strengthened fiberboard shipping container, called a "cheese drum," that could withstand 45 days of soaking better than other fiberboards soaked only two days.

"This was accomplished," said G. H. Chidester of the laboratory's industrial chemical division, "by use of an asphalt size to give water repellency and small amounts of synthetic resins to provide retention of strength. This treatment also improved the strength of the board in the dry condition and thus made it

possible to use greater percentages of lower-grade fiber such as waste paper in meeting performance requirements. Rough handling tests showed that containers made from wet-strengthened board containing no new pulp were as good when dry and better when wet than ordinary nonwet-strengthened containers in which 65 percent new kraft pulp was used."

But perhaps the most spectacular development in laboratory packaging research was a box equipped with fiberboard airfoil wings that can be dropped from an airplane without a parachute. Known as a "free-fall container," this amazing box was developed too late for actual battlefront use, though it proved practical in tests conducted by the Army Air Forces.

As the box falls through the air, the wings cause it to rotate thereby retarding the rate of descent and limiting the impact at landing. Mechanical reduction of the rate of rotation, necessary to maintain the box in the upright position required for operation of the wings, is accomplished by use of an auxiliary fiberboard piece mounted on top of one of the wings. This piece billows with air as the rate of rotation increases, providing drag which counteracts the increase in rotation.

Capable of carrying a net load of 75 pounds, the free-fall container costs only a fraction of that of a box equipped with a parachute. Also, it has the advantage of being inconspicuous, whereas a parachute is highly visible to an enemy. The box was designed for dropping supplies to beleaguered troops or to persons lost in remote areas.

There was little drama in the ordnance wrapping materials tested at the laboratory, but the results were vitally important to the overall packaging program. Some idea of the extent of this research may be had from testing records from 1941 to the summer of 1945. Dealing only with major items, actual tests were made during this period of 1,500 samples of greaseproof wrappings, 500 samples of waterproof papers, 350 samples of adhesives used for closing case liners, 325 samples of adhesives used for sealing fiberboard boxes and 325 samples of pressure-sensitive tapes.

On the other hand, one can conjure at length with the peacetime possibilities of plastic corrosion-preventive coatings developed for long-term outdoor storage. One example of these spray-type strippable coatings is a flexible synthetic resin lacquer which does not adhere to metal, and which is highly resistant to water vapor. In application, as explained by E. C. Jungmann of Madison's paint laboratory, "the basic lacquer is modified for the first coat by the addition of a webbing agent which causes the material to issue from a spray gun as long cobweb-like filaments which will bridge openings two feet or more wide.

"When an artillery piece, for example, is to be packaged with this coating, tapes, ordinarily 12 to 16 inches apart, are run between projected points to form the framework for a package. The entire piece is then sprayed with the lacquer and webbing agent until it has been completely shrouded with fine strands. Subsequent coats of lacquer without the webbing agent are applied to this foundation until a final film has been built up.

"The film is then slit at two points and warm air blown through the interior of the package to remove solvent vapors. A drying agent, such as silica gel, is placed within the envelope, a humidity indicator is inserted, and a plastic window is sealed in place. When the slits have been sealed, the package is complete."

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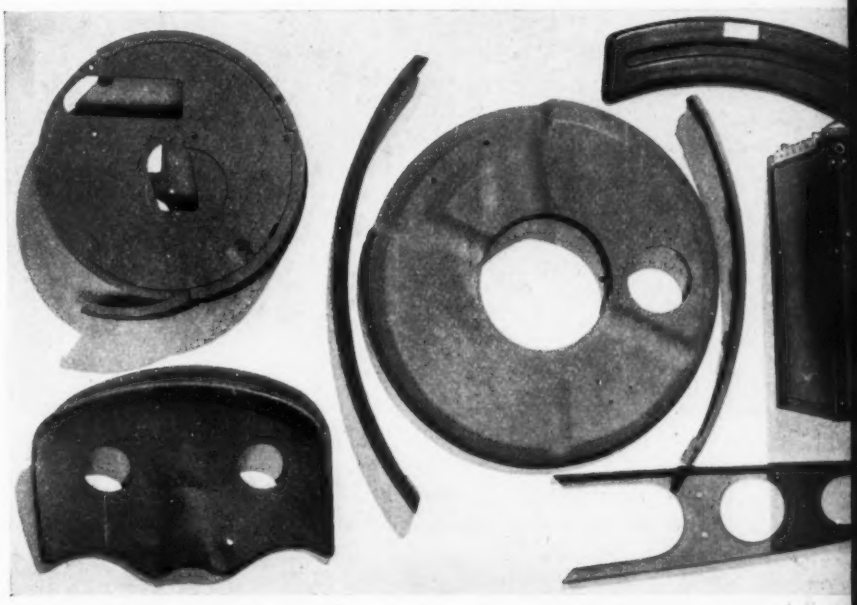
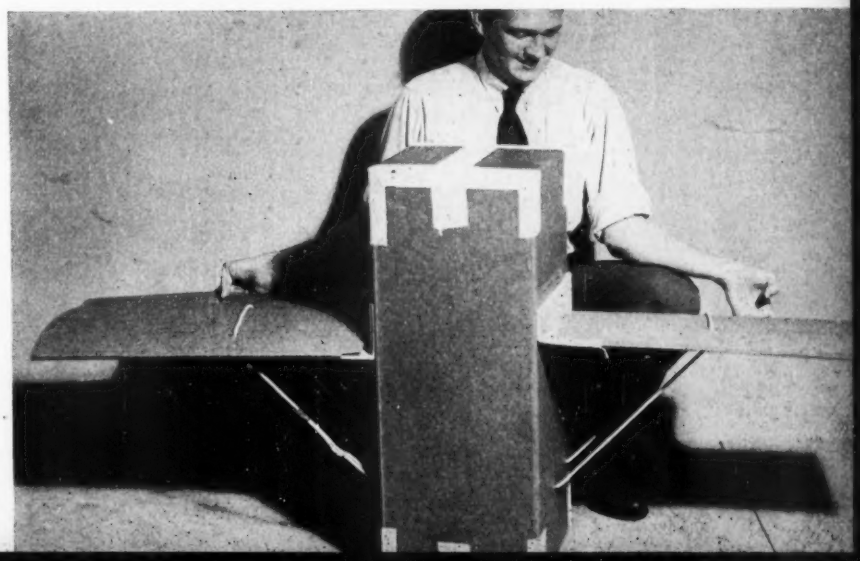
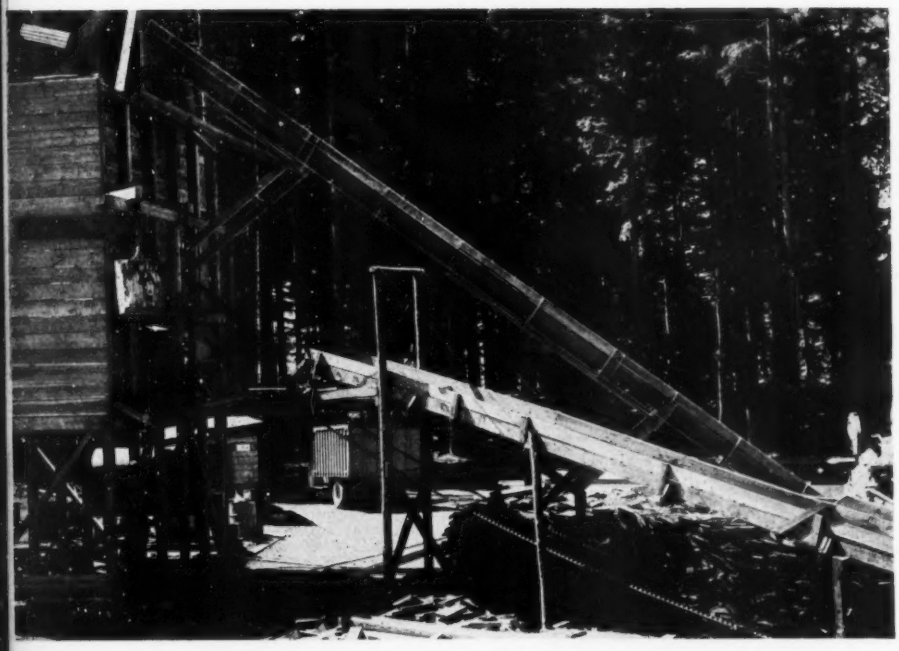


Aircraft parts of papreg, high strength paper laminate. Gun shield and gunner's seat are on the left, turret floor in center and ammunition box on right. Below, Madison's flying box, or free-fall container



FUEL SPECIALIST

By ALBERT ARNST



Top conveyor belt feeds slabwood from sawmill into hopper, the lower belt handles cordwood. Circular hopper of splitting machine (below) rotates on turntable—1,650-pound knife drops from cupola at left

IF anyone in Vancouver, Washington, and vicinity gets cold feet this winted, it won't be the fault of Otto M. Eash. At his mechanized operation northwest of Camas, slabwood, cordwood and sawdust are being mass produced along with lumber and crossties.

To say that Eash has revolutionized the prosaic business of fuelwood production would not be overstating the case. An ingenious turn of mind enabled him to design and build a series of machines which are the last word in efficiency and manpower saving. Slabwood for fuel is produced as a by-product of a sawmilling operation; a mechanical wood cutter and splitter turn out cordwood; sawdust from both the sawmill and cordwood machine is utilized. Every part of a tree finds a market when it goes through Eash's efficient setup.

A volume production enterprise such as this requires large quantities of raw material to feed the hungry saws and Eash at present is clear-cutting a 70-year-old Douglas-fir stand. The area is in an agricultural community and, when cleared, may have farming or residential value.

A light Diesel Caterpillar tractor snakes the tree lengths into the main mill landing. Straight, high-quality trees are routed to the sawmill deck, where they are bucked into various log lengths. Crooked, poor-quality trees are piled alongside a chute which feeds into the cordwood machine.

Sawlogs go straight from the deck onto the carriage of a semi-portable mill which has a daily capacity of 20,000 board feet of lumber, crossties and dimension stock. Eash is chief sawyer on this unit and sees to it that all logs produce their best cuts. Every speck of sawdust is conveyor-belted into a large hopper alongside the mill, from where it is hauled to consumer markets.

Log slabs are a prized commodity in this operation. Down on the green chain end of the sawmill unit, two men are kept busy with electric swing saws. One trims boards to

Some say that Otto Eash has revolutionized the business of fuelwood production — certainly there is no waste in this efficient mill

various lengths before they are stacked in the yard for seasoning, while the other converts log slabs into 16-inch chunks for fuelwood. These chunks fall onto a conveyor belt that dumps them into a large slabwood hopper for storage.

Trees too poor to make lumber or crossties are rolled from their cold deck pile directly into a ground chute which feeds at right angles into the big drop saw of the cordwood cutting machine. A single motor powers the chute feed, the conveyor belt from the saw into the cordwood hopper and the saw itself. One man manipulates the centrally-located, hydraulically-operated levers which feed the tree into the saw, control the drop and lift of the saw and run the conveyor belt.

In operation, a tree length is fed into the saw by a cable hooked onto its far end as it lies in the chute. A drum takeup pulls the tree into the saw in 16-inch "stops" and a bolt that length drops off every time the saw is lowered. A conveyor belt moves it along to be dumped into a large washtub-like circular hopper. Sawdust is carried into the same hopper that stores sawmill by-products.

Eash has kept mobility in mind in designing this unique cordwood machine, which can buzz out 12 to 15 cords a day. The rig is mounted on a heavy chassis which can be trailed behind a heavy truck. Set up for operation, the two trailer wheels are dropped into pits dug in the ground and a temporary platform and roof is put over the unit for all-weather use.

The circular hopper for storing cordwood bolts is ingenious. The sides are stationary but the floor rotates on a turntable, powered by a small motor. The hopper has only one side opening, which allows the 16-inch bolts to be taken out for splitting into cordwood chunks.

When the hopper is filled to the required level, the splitting machine operator, stationed on the side opposite the conveyor belt dump, rotates the hopper bottom to bring the bolts around to the opening beside the splitting machine. Without leaving his position, he is able to remove the bolts and set them on the solid circular table stand for the splitting process.

The splitter is a guillotine-like affair consisting of a 1,650-pound weight faced with two crossed knife blades. The weight, hoisted into an overhead position by a power drive, is tripped mechanically. When it drops, each bolt of wood becomes four chunks of cordwood without further argument.

The quartered bolt sections drop onto another conveyor belt which carries them into an overhead dumping position at the bottom of the slabwood hopper.

Under ideal manpower conditions, the sawmill unit and cordwood machine can run at the same time. From eight to ten men are needed to carry on full scale operations. With the manpower situation as it is today, however, Eash finds it necessary to run one machine at a time.

Here, indeed, is a novel way to utilize everything in a logging operation. Trees go in two directions from the main mill landing, according to their quality. Sawlogs end up as lumber, slabwood and cordwood logs as split fuelwood. The finished product is ready for delivery in a convenient loading position, and machinery has enabled assembly line processes to be employed in an industrial operation which has seen few innovations. Similar techniques could well be applied in other commonplace processes.

A large amount of raw material is required to feed the sawmill and cordwood machine. Here operations are in a seventy-year-old stand of Douglasfir

KNOWING YOUR TREES

CASCARA BUCKTHORN

By WARREN D. BRUSH

(*Rhamnus purshiana* de Candolle)

CASCARA buckthorn occurs from sea level to 3,000 feet most commonly from the Puget Sound region of British Columbia and Washington southward into central California. It also is found in northeastern Oregon and extends eastward through northern Washington to the Bitter Root Mountains of Idaho and to Flathead Lake in Montana.

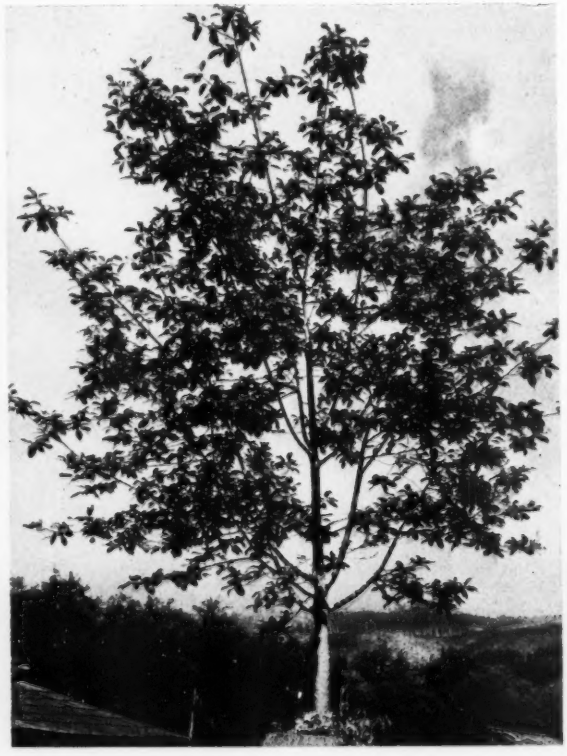
Locally called bearberry, chittim, bearwood, coffeeberry, coffee-tree, bitterbark and wahoo, the species was discovered by the Lewis and Clark Expedition in Montana in 1805-06 and was collected at Kamiah, Idaho, the next year. Frederick Pursh first described it but duplicated another name by designating it as *Rhamnus cathartica*. In 1825 the French botanist de Candolle corrected this error and recognized Pursh's work in the specific name. In *materia medica* it is called cascara sagrada, a Spanish term meaning holy bark, derived from the wood's supposed resemblance to that used in the ark of the covenant.

Usually a medium sized tree 20 to 40 feet high and 6 to 15 inches in diameter, it has been observed with diameters of two to three feet. Open-grown trees have a short stubby trunk and a thick bushy crown, with numerous large upright limbs. Forest-grown trees have long slender trunks and a light crown, with the stem devoid of branches for 15 or 20 feet. The species assumes a shrub-like form in the drier parts of its range.

The bark, one-tenth to one-fourth of an inch thick, ranges in color from dark brown to ashy gray, and is broken on the surface into short, thin scales. Young bark frequently resembles that of bigleaf maple (*Acer macrophyllum*). The freshly cut inner bark surface is bright yellow, but darkens rapidly on exposure to air. It has a bitter taste and colors saliva yellow.

The bark has been well-known as a laxative since 1877 and is collected extensively from trees in western Oregon and Washington, southern British Columbia and northern California. The annual harvest approximates four to five million pounds and comprises a forest industry of major importance to some rural regions. On these accessible acres bark peeling inroads have kept down the average diameter to six inches or less; and such trees provide the major source of the bark harvest.

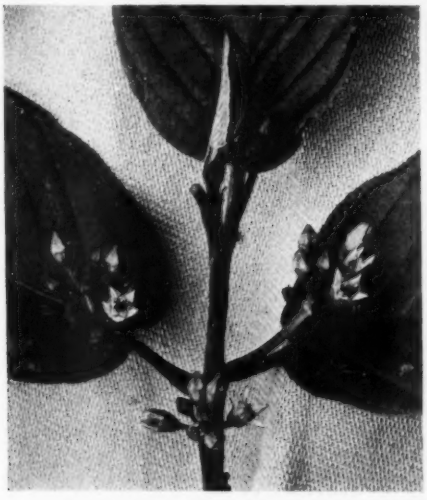
Large numbers of trees are destroyed, chiefly because the tree is not cut down after its bark has been peeled. Actually more than 50 percent of the active principal in a mature tree is stored in the woody parts. Stumps sprout vigorously and produce from 4 to 15 stems. For this reason there is no dearth of wild bark at present. However, the demand is growing even in competition with synthetic products; and each year the bark-gatherers must go farther and farther back into the mountains. Planta-



Open-grown trees have a short stubby trunk and a thick bushy crown, with large upright limbs. Usually it is of medium size, twenty to forty feet high and six to fifteen inches in diameter

Natural range of Cascara buckthorn. It is often found scattered on cutover land

Fine hairs protect the scaleless buds



Simple leaves have prominent veins. The small flowers cluster at branch ends

The fruit is a drupe, smooth and black, with juicy pulp and thin sweetish juice

tions have been attempted on a small scale, but so far have not proved feasible.

Mature twigs are smooth or slightly and minutely downy, usually dull reddish brown. Cascara is the only known deciduous tree on the west coast whose buds are not covered by bud scales. A coat of fine, rusty brown hairs protects the young leaflets. This naked bud serves as a means of winter identification.

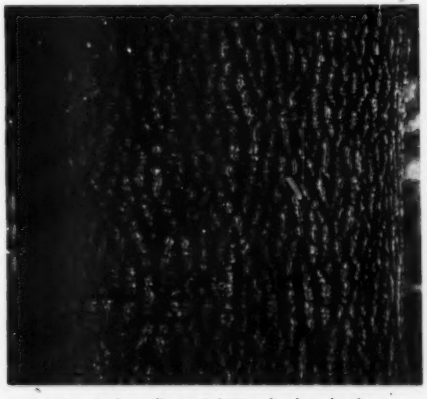
The simple leaves are deciduous, except in seedlings, which retain their yellowish leaves through the winter. Leaves are broad-elliptical, with a broad and prominent midrib and primary veins and a finely serrated margin. One and a half to seven inches long and about two inches wide, they are bluntly pointed at the apex and slightly cordate at the base, with short hairs on the lower surface. They are commonly confused with those of red alder (*Alnus rubra*).

Flowers appear in May or June. They are small, five-petaled, greenish in color and are carried on slender hairy stalks in clusters near the ends of branches.

The fruit, maturing in August or September, is a drupe, one-half to one-third inch in size, smooth and black, with juicy, rather thin sweetish pulp, containing two or three hard, smooth, olive-green seeds. It is much relished by birds, and the tree's ubiquitous appearance along fencerows can be attributed to this fact. The fruit matures in one season. The tree is a prolific seeder.

The wood is pale, yellowish brown, with a faint tinge of red, hard and heavy, weighing 36 pounds per cubic foot in an air-dry condition. The layer of whitish sapwood is thin in forest-grown trees but thick in open grown ones. It has no economic use other than for fuel, but could be used for turnery purposes.

Cascara buckthorn occurs commonly as scattered individuals or sprout groups on cutover lands, along rural fencerows and country lanes. In the forest, the tree mixes with Douglasfir, western redcedar, hemlock and bigleaf and vine maples; in broad river bottoms it is crowded out by the more rapid-growing alder and cottonwood trees. Plenty of moisture and a slightly sandy soil are necessary for the abundant growth and large size of this tree.



Extensively collected bitter bark is broken on the surface into short thin scales

Virginia DEER HUNT

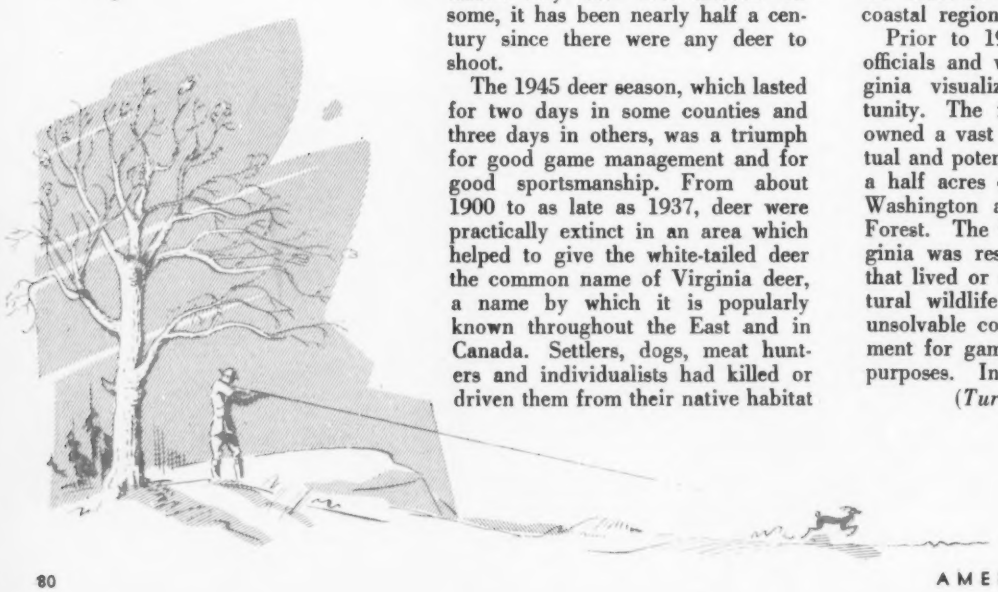
A victory for game management

LAST November, eight counties west of the Blue Ridge Mountains of Virginia had the first legal deer hunting season they have ever known. In some, it has been nearly half a century since there were any deer to shoot.

The 1945 deer season, which lasted for two days in some counties and three days in others, was a triumph for good game management and for good sportsmanship. From about 1900 to as late as 1937, deer were practically extinct in an area which helped to give the white-tailed deer the common name of Virginia deer, a name by which it is popularly known throughout the East and in Canada. Settlers, dogs, meat hunters and individualists had killed or driven them from their native habitat —the Virginia uplands. Here the deer lacked the protective swamp and water escape areas more favorable to the survival of the species in the coastal regions.

Prior to 1937, state and federal officials and wildlife leaders in Virginia visualized a grand opportunity. The federal government owned a vast upland game land, actual and potential, in the million and a half acres comprising the George Washington and Jefferson National Forest. The Commonwealth of Virginia was responsible for the game that lived or could abide in this natural wildlife area. There was no unsolvable conflict between management for game and for other forest purposes. In fact, the forests were

(*Turn to page* 92)



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Since the No. 1 unit was put to work in the woods, the demand has steadily grown until now the volume of orders is by far the greatest in Gar Wood history. Gar Wood Bulldozers and Dozecasters are preferred equipment in the Forest Products Industries because they are forest-proved. Place your orders with your local Allis-Chalmers dealer.

Fast action in leveling slopes is provided by the Gar Wood Cable Dozecaster.
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Death in the Wilds

(*From page* 65)

As a contrast, in the world of birds, penguins seem to seek the companionship of their fellows in death. Dr. R. Murphy, of the American Museum of Natural History, tells this story: In South Georgia, the lonely ice-covered group in the South Atlantic, a dependency of the Falklands, and inhabited only by scientists carrying on research relating to whales, he was surprised that he hardly ever found the dead bodies of full-grown penguins.

This puzzled him, until one day at the summit of a long hill, he came upon a little transparent lake of snow water, and around its margin stood several sickly-looking penguins, silent and drooping, seemingly exhausted by the long climb from the beach. "I don't know why," said he, "but the air seemed oppressed with tragedy."

He walked to the pool and looked into its translucent depth. On the cold blue bottom, with their flippers outstretched were hundreds (possibly thousands) of dead penguins that had made the last weary climb to reach that peaceful spot. They lay face up, their breasts reflecting gleams of light from the darker water. For months, perhaps years, they would undergo no bodily change in that frozen grave.

A. F. Tschiffely, who once rode horseback from Buenos Aires to Washington, commented on another occasion, when he was traveling south into Patagonia, on the habits of penguins at the point of death.

He said, "As a rule, when penguins walk inland, they are sick and about to die. In some places regular paths have been made where the birds go on their last walk, usually toward some hill, on the top of which are veritable penguin graveyards, many bones and feathers lying about." As in the Antarctic instance quoted by Dr. Murphy, there seems the double urge—to leave the sea and to make for the highest spot available.

Penguins are not the only oceanic creatures which appear to want to get away from their usual habitat when death comes upon them. Is it that they feel they have no longer the strength of body and of will to face the fury of the seas?

Carcasses of seals are found in the midst of the Patagonian pampas, sometimes great distances from the coast. In that country it is generally believed that as soon as a seal feels the end is approaching, it starts to make its way inland as far as it can go, generally dying on top of one of the small hills which abound there.

A tragedy occurred in that same continent, along the coast of Chili, north of the port of Coquimbo, just 20 years ago, which casts light on this same urge. From Coquimbo northward the seashore was absolutely lined with a string of sea birds, locally called guanay, dying or vainly struggling against the smallest wavelets.

To observers it was a pitiable sight to see these poor birds getting washed onto the shore, but it was remarkable to see how as they touched land, they endeavored to walk inland as far as possible before they collapsed and died.

Not many managed to struggle more than a few yards, but between Arica and Tacna some not quite dead were seen as much as two miles from the coast. Their desire was always quite evident—to get as far inland as possible.

The reason for this calamity appears to have been that for some unknown reason that year the Humboldt current of the South Pacific altered its course, taking its supplies of fish further out into the ocean, and that the birds had failed to discover its new direction of flow.

Those who watched the tragedy along an extent of coast of over 1,200 miles reported that the loss of bird life must have run into many millions. The corpses were practically contiguous, and often in groups of eight to ten deep.

To return to the Antarctic—Surgeon Commander G. Murray Levick, who was with Captain Scott on his last Polar expedition, discovered a large seal "cemetery" at "Hell's Gate," near the Drygalski ice barrier, only a few hundred yards from the sea ice. There the frozen and mummified bodies of a very large number of seals were lying on a patch of ground in a clump just as if they had been carried and left there by human beings, which, of course, was impossible.

The varying ages of the bodies showed that the clump had been added to throughout the centuries. It was quite out of sight from the ice-foot from which the seals had crawled from the sea to that particular spot to die. To Commander Levick and his companion it was an almost incredible and rather awe-inspiring sight.

To turn to a sharply contrasted part of the world, the steaming jungles and forests of the tropics, where the "King of the Jungle" dwells, probably more has been written about how the elephant meets its end than any other animal. The most widely told tale, indeed, which concerns the death of animals is that about the almost legendary undiscovered graveyard of the elephants. It is recorded of India and Siam as well as of Africa.

The story tells how elephants, when they grow old and feel themselves unable to forage successfully any more, go away. Alone they travel over miles of veld, through jungles, and between hills until at last they find the place to which all elephants retire to die. It is a spot unknown to any human being, although every elephant eventually heads for it unerringly.

Romantic in the extreme, but unfortunately there does not seem to be any foundation for the story. One of the reasons why this legendary bourn is so often spoken of is that it seems to account for the strange absence of dead elephants.

It used to be said that nobody ever found a dead elephant, which is partly true, for he often dies in thick forest territory, and innumerable beasts and the rapid decomposition which sets in because of tropical heat, quickly account for the body, huge as it is. At night ants, jackals, hyenas, possibly a lion or a leopard, do their work; and by day storks, eagles and vultures carry on the scavenging.

White men may not know of the death of an elephant, but very often natives are aware of it. The wheeling of vultures over a spot in the jungle tells the story and they hasten to the spot to get the ivory. In many territories government authorities claim a part of the ivory found in this way. Because of this the tribes seldom report the death of an elephant, hoping to keep all the tusks.

But does the forest claim every elephant that dies? It is estimated that 2,000 elephants die each year in Africa. Certainly that number of bodies is never found. When Sir William Gowers was Governor of Uganda he put forward an ingenious theory to account for this.

Although Uganda has at least 20,000 elephants, for years he did not see a dead one. Then he found one, splendid in death, on the left bank of the Victoria Nile. Apparently it had crossed the river as it had been wont to do for scores of years, but

(*Turn to page* 87)

IN 15 MINUTES
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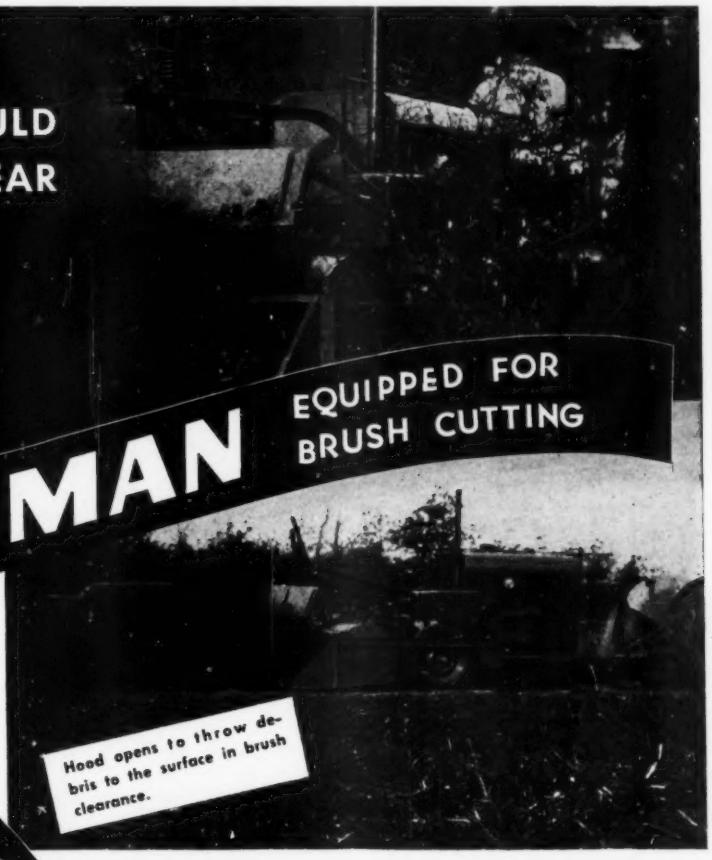
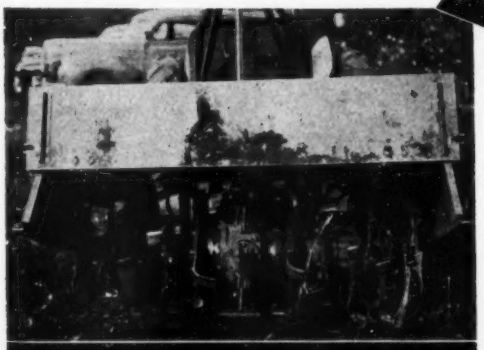
The SEAMAN EQUIPPED FOR BRUSH CUTTING



Hood opens to throw debris to the surface in brush clearance.

The SEAMAN especially equipped with power-driven, spring-steel tines rotating at high velocity, tears, chops, shreds and mills forest brush to cut a clean, four foot swath for the construction of fire lanes, clearing for access roads or forest trails — or for any purpose in which a fast, economical land clearing operation is demanded. If brush root systems are also to be removed the SEAMAN may readily be used to dig and throw them to the surface. Large roots of trees demand special techniques to sever them before removal, but subsequent use of the SEAMAN brings them to the surface for disposal.



Specially designed tines and rotor solve brush clearance problems for making fire lanes, constructing forest trails or clearing for access roads.

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This manual, compiled by SEAMAN engineers, describes not only the several soil stabilization processes but also details a number of special uses for the SEAMAN machine which are of interest to those concerned with forests and parks. Ask for Bulletin AF-24. N-6

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CONSERVATION IN CONGRESS . . . .

By A. G. Hall

THE second session of the 79th Congress opened with action pending on many conservation bills, but prior to its adjournment the first session had passed and the President had approved the bill providing for authority to reorganize government agencies. As passed, the bill is essentially that reported in the January issue.

The Murray bill to establish a Missouri Valley Authority was reported from the Committee on Agriculture and Forestry on January 17. Senator Murray had recommended that committee hearings be postponed because of the many bills and proposals on reconversion before the Senate. The bill, therefore, remains with the committee for future consideration.

The President's budget message, sent to the Congress on January 21, included substantial increases in many conservation items. Athough the budget is designed to reduce the overall national debt, it was found that not many corners could be cut in providing for rehabilitation of natural resources.

The budget estimate for the U. S. Forest Service provides for an increase of $26,295,444 for forest highway and road development. This sum is part of the increase authorized by the Act of December 20, 1944, for road development following the war. Provision also is made for renewal of the acquisition of lands for national forests, a program suspended during the war. Increases have been recommended for the protection and management of national forests, the further development of land utilization projects, and for forest fire cooperation, the latter calling for an increase of $1,000,000 in Clarke-McNary funds. A substantial increase is recommended for forest resources investigations, $1,000,000 being estimated for the Forest Survey in 1947 as against $153,451 for 1946.

Increases are made in the estimates for eradication of white pine blister rust in the budgets of both the U. S. Forest Service and the Bureau of Entomology and Plant Quarantine.

Extension activities as a whole remain about at the same level as in 1946, a decrease in the appropriation for the Agricultural Adjustment Administration (not shown in the accompanying table) being offset by an increase for Soil Conservation Service operations and increases in grants to states for cooperative agricultural extension work.

CONSERVATION IN THE 1946-1947 BUDGET

Appropriation and Project	*1947 Budget Estimate*	*1946 Appropriation*
Department of Agriculture		
Forest Service: (Total)	$77,097,020	$41,339,809
General Administration	610,000	542,000
National Forests: (Total)	20,915,000	18,926,011
General Management	6,135,913	6,092,491
Maintenance of Structures	1,649,389	1,140,889
Fire Control	6,158,335	6,131,301
Forest Pest Control	98,787	98,787
Timber Sales	3,044,502	3,027,202
Grazing Administration	712,102	607,580
Wi'dlife Protection	126,689	125,969
Policing	313,805	212,723
Land-Use Management	1,181,954	697,514
Water-Use Management	37,030	36,761
Improvement Constructions	71,684	71,484
Planting and Plantation Care	1,384,810	683,310
Fighting Forest Fires	100,000	*100,000
Land Acquisition	3,392,000	.....
Cooperative Work (Total)	8,963,327	7,931,270
Fire Suppression (Clarke-McNary)	8,300,000	7,300,000
Forestry Cooperation	663,327	631,270
Research (Total)	4,163,000	2,404,400
Forest and Range	1,706,000	970,900
Forest Products	1,385,000	1,228,900
Forest Resources Investigations	1,072,000	204,600
Roads and Trails	36,214,222	9,918,778
Naval Stores Investigations	140,000	125,000
White Pine Blister Rust Control	2,599,471	1,392,350
Forestry in Other Agricultural Bureaus		
Bureau of Entomology and Plant Quarantine		
Gypsy and Brown-tail Moth Control	404,800	306,300
Dutch Elm Disease Eradication	285,500	284,200
Forest Insects	288,900	287,000
White Pine Blister Rust Control	3,754,111	1,501,563
Soil Conservation Service (Total)	38,078,000	29,754,300
Extension Service		
Private Forestry Cooperation	108,173	101,230
Bureau of Plant Industry		
Forest Diseases	321,500	252,700
National Arboretum	31,000	26,800
Department of the Interior		
Grazing Service (Total)	1,784,500	1,142,920
General Administration	1,504,000	979,470
Range Improvements	223,000	105,950
Leasing Lands	7,500	7,500
Fire Fighting	50,000	50,000
General Land Office		
O and C Lands—Adiministration and Protection	317,000	310,000
Range Improvements Outside Grazing Districts	50,000	46,430
Protection and Timber Management Public Domain	426,000	532,509
Bureau of Indian Affairs (Total)	972,000	769,738
Administration of Forests and Range Resources	960,000	757,738
Forest Fire Suppression	12,000	12,000
Soil and Moisture Conservation Activities	1,800,000	1,200,000
White Pine Blister Rust Control	646,418	229,954
National Park Service (Total)	32,643,215	4,763,015
Fish and Wildlife Service (Total)	12,508,275	7,639,325
Office of Fishery Coordination	.....	212,500

*Supplemented by a deficiency appropriation estimate of $3,483,000.

CONSERVATION CALENDAR

Important Bills in Congress With Action to January 22, 1946

Bills Enacted

H. R. 4805—Making appropriations to supply deficiencies in certain appropriations for the fiscal year ending June 30, 1946, and for prior fiscal years, to provide supplemental appropriations for the fiscal year ending June 30, 1946. Approved December 28. Public Law 269.

H. R. 608—STOCKMAN (S. 932)—To exclude certain lands in Deschutes County, Oregon, from the provisions of Revised Statutes 2319 to 2337, inclusive, relating to the promotion of the development of the mining resources of the United States. Approved December 21. Public Law 267.

H. R. 4129 (H. Res. 360) (S. 1120)—To provide for the reorganization of government agencies. Approved December 20. Public Law 251.

S. 1366—To authorize the State of Tennessee to convey a railroad right of way through Montgomery Bell Park. Approved December 21. Public Law 266.

Stream Control

S. 555—MURRAY—(H. R. 2203)—To establish a Missouri Valley Authority, etc. (See Calendar, January issue.) Reported in Senate, January 17. Report No. 889.

H. R. 4932—To amend Section 9 of the Boulder Canyon Project Act, approved December 21, 1928. Passed House January 22, 1946.

H. R. 5083—JACKSON—(S. 1716—MITCHELL)—To establish a Columbia Valley Authority to provide for integrated water control and resource development on the Columbia River, its tributaries, and the surrounding region in the interest of the control and prevention of floods, the irrigation and reclamation of lands and promotion of navigation, the providing of employment, the strengthening of national defense. To Committee on Rivers and Harbors, December 20.

Fish and Wildlife

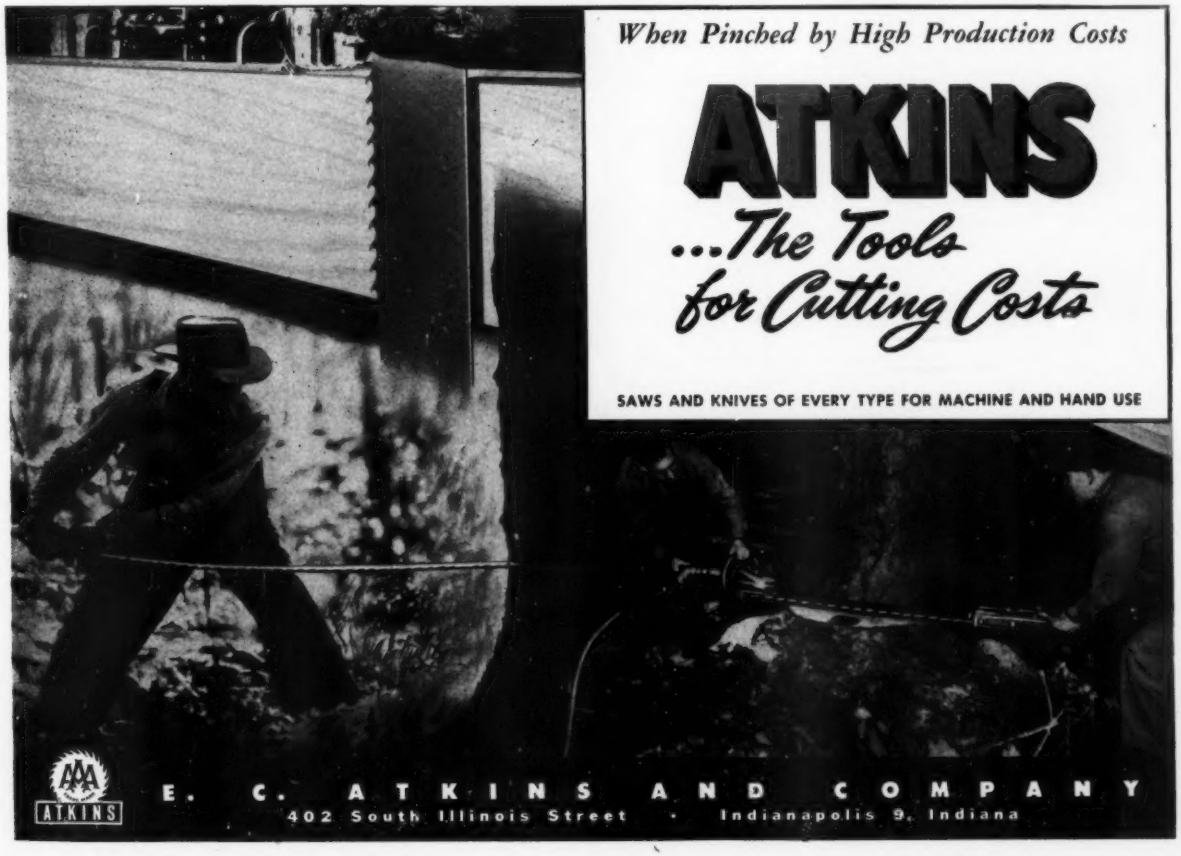
H. R. 5004—ANGELL—To provide for the protection of the Dall sheep, caribou, and other wildlife native to the Mount McKinley National Park area. To Committee on Public Lands, December 14.

H. R. 5021 — BIEMILLER — To amend section 2 of the Migratory Bird Hunting Stamp Act of March 16, 1934. To Committee on Agriculture, December 17.

Miscellaneous

H. Res. 467—HAVENNER—Request for information on amount of lumber and other building materials for construction or housing for war veterans which is in the possession or control of the Navy Department in the United States and outside the territorial limits of the continental United States. To Committee on Naval Affairs, December 20.

H. Res. 468—HAVENNER—Similar to H. Res. 467, above, but dealing with lumber in possession or control of the War Department. To Committee on Military Affairs, December 20.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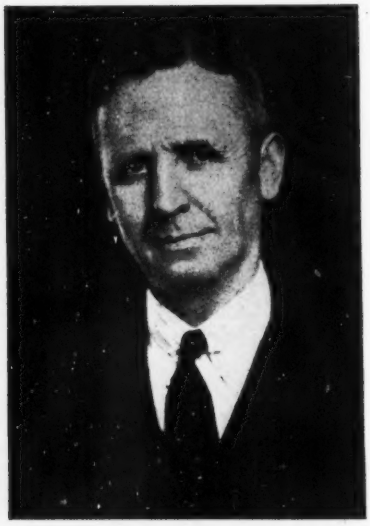
Allen Elected SAF President

Shirley W. Allen, professor of forestry at the University of Michigan, Ann Arbor, was elected president of the Society of American Foresters for the two-year term 1946-1947, at the biennial election of officers held on December 15. For the past four years he has been vice-president. He



Shirley W. Allen

succeeds Dr. Henry Schmitz of the University of Minnesota, St. Paul.

Clyde S. Martin, chief forester for the Weyerhaeuser Timber Company, Tacoma, Washington, was elected vice-president.

These two officers, together with nine other members, comprise the Council of the Society. The additional Council members elected were: John D. Coffman, chief forester, National Park Service; Walter J. Damtoft, assistant secretary, Champion Paper and Fibre Company, North Carolina; Paul M. Dunn, dean, School of Forestry, Oregon State College; Charles F. Evans, assistant regional forester, U. S. Forest Service, Atlanta; James C. Evenden, U. S. Bureau of Entomology and Plant Quarantine, Coeur d'Alene, Idaho; William B. Greeley, forest management consultant, West Coast Lumbermen's Association, Seattle, Washington; Clarence S. Herr, assistant resident woods manager, Brown Company, Berlin, New Hampshire; Jay H. Price, regional forester, U. S. Forest Service, Milwaukee, Wisconsin; and Arthur B. Recknagel, New York State Conservation Department.

British Forests Bled in War

On several occasions it has been indicated that the forests of Great Britain have been largely denuded to meet the needs of the war. Statistics issued recently by the British Ministry of Supply indicate that the extent of the felling over the war period amounted to around two-thirds of the national reserves of softwoods and one-third of the national reserves of hardwoods. The production of timber in Great Britain and North Ireland from 1939 to June 1945, amounts to 17,400,000 import tons of sawn hardwoods and softwoods, and mining timbers.

Lumber Problem to Remain in 1946

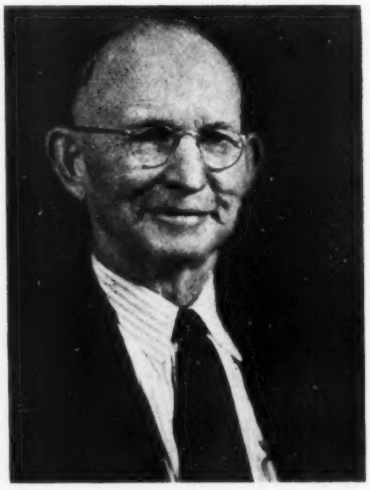
Definitive estimates of lumber requirements for 1946 are not yet available, but preliminary studies indicate that domestic consumption needs will run no less than 29 billion board feet to which must be added a need for four to six billion feet to refill distribution pipelines, according to the Civilian Production Administration. Demand therefore can be estimated at from 33 to 35 billion feet, while it seems clear that production will be hard pressed to exceed 30 billion. Imports are expected to amount to about a billion feet. Although exports of lumber may be greater in 1946 than in 1945, the quantity of construction items leaving the country will probably be only one-third the size of the imports of similar items.

Mexico Develops Hardwood Industry

An experiment in scientific lumbering of certain deciduous hardwoods has been initiated by the Mexican Ministry of Agriculture. A 50-year concession has been granted by presidential decree to a lumber company for the development of a large tract of timberland and the operation of a kiln drying plant. Since no industry has heretofore existed in Mexico for preparing and drying hardwoods, manufacturers have imported more than half of the materials used in the manufacture of furniture, flooring, doors and other articles. Mexico is believed to possess hardwood resources that are ample to supply the entire domestic market and leave an exportable surplus if suitable processing facilities are made available.

Ace Wartime Trouble Shooter Retires

James W. Girard, veteran forester and ace trouble shooter for the U. S. Forest Service during the war, retired January 1. Wartime timber production problems took him to Alaska, Puerto Rico, the Pacific Coast, the South and to the Northeast, but it was all one to Girard, who was born 67 years ago in the Tennessee hills, and who worked his way up to be assistant director of the Service's Forest Survey. He is also on the advisory committee of the Forest Resource Appraisal of The American Forestry Association. Lumberjack, saw filer, mill operator, forest guard, logging



James W. Girard

engineer and generally recognized as one of the ablest timber cruisers in the United States, Girard began his Forest Service career as a timber marker in Montana in 1907. He worked at various times for private industry.

Death in the Wilds

(*From page* 82)

having cleared the river, died, overtaxed by age and feebleness, when endeavoring to climb the six-foot muddy bank beyond.

Sportsmen have reported that often ailing elephants make for water and immerse themselves to the tip of the trunk. It is possible that some veterans, upon whom death is advancing, do not realize they are no longer capable of dragging themselves out of the muddy bottom of the river, and sink actually in the water.

They are sucked into the deep mud; towering papyrus and other water growths quickly cover them, and they are lost to man. Sir William believed that thousands of tons of ivory may lie buried in the Nile and the waters of other African rivers.

How does this theory accord with the stories of great finds of ivory and bones in particular spots, suggesting that these are elephant "cemeteries"? Sir William suggested that these are the beds of old watercourses, where the animals were bogged.

And yet, can this theory entirely account for a scene in the northern part of the mandated territory of Southwest Africa? There lie over 100 thousand square miles of almost unexplored country, in the heart of which exists one of the most mysterious and haunting spots on earth.

Etosha Pan, the Lake of Slime, is about 75 miles long and 50 wide, and is believed to be unique among animal "cemeteries". Travelers say that approached by night from the northeast the pan presents a terrifying spectacle.

Thousands of bleached skeletons gleam in the moonlight; skeletons which seem unable to rest even in death, for many still stand in the tortured attitudes caused by frantic efforts to escape unknown years ago. Specimens of almost all the creatures known to Africa may be seen from the fringe of the pan.

What lured them there? Surely not all were caught in the mud and perished accidentally. Indeed, some may have died from thirst, for although at one time a great river flowed into the pan it has carved a new way to the sea, and at some seasons the lake is dried up.

What is it a dying creature seeks? Not all the migrations of death mentioned in this account can be fortuitous. The entire subject of how creatures in the wild meet their end is an alluring one.

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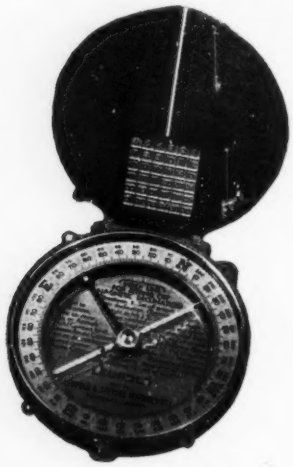

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National Resources Policy Proposed

"THE future prosperity of the nation depends to a large extent upon sound conservation and proper utilization of our natural resources." That is the first sentence, under objectives and policy, of the new McCarran Bill (S. 1634) to establish a natural resources policy, to create a natural resources council, and to provide for a natural resources inventory.

The bill, referred to the Committee on Public Lands and Surveys on November 29, is as far-reaching as any conservation bill ever laid before the Congress. It calls for a national inventory of all natural resources of the United States, its territories and possessions, to be kept reasonably current at all times, with an annual accounting on a national basis of the rates of depletion. Estimates of the probable future production, utilization, and rate of depletion are to be made yearly for a period covering 10 years, with annual revisions. Except where military necessity makes secrecy desirable, all the facts are to become public property. Thus the bill provides for a knowledge of natural resources never before available in the history of the country.

The policy calls for a look ahead to the probable national requirements for each and every critical or strategic material for war production and for essential civilian production in time of war, the encouragement of private enterprise in the discovery and development of new sources and new technologies for the production and utilization of resources, protecting the rights of the individuals and at the same time lending government assistance where necessary to get the job done.

Except by direction of the President pursuant to a treaty obligation or in the interest of national defense or the prosecution of a war, the export of critical or strategic materials would be barred, and the government would take steps to accumulate a natural resources stockpile sufficient to meet future requirements of production for a period of at least three years of war.

To carry out the natural resources policy, a natural resources council would be established composed of the Secretary of the Interior, ex officio, the Secretary of Agriculture, ex officio, and three members appointed by the President with the advice and consent of the Senate. Of the three appointed members one shall hold a degree in mining engineering, metallurgy, or geology, and one shall have a degree in science or agriculture. For 15 years prior to his appointment one member shall have held positions of outstanding responsibility closely connected with the mining industry, and the other shall have had similar experience in agriculture, forestry, or soil conservation. The three appointed members are to receive compensation at the rate of $12,000 a year.

The council may employ an executive officer, a general counsel, a chief economist, and a chief statistician, each at the rate of $10,000 a year, and within the limit of appropriations provided may appoint and prescribe the duties of such other officers and employees as it shall deem necessary. While the top jobs may be filled without regard to Civil Service, all other positions must be filled under the Civil Service laws.

In addition, the council may call upon other government agencies for assistance in the accomplishment of any of the purposes of the Act, and may pay for such services when they are outside the authorized powers of the agency called upon. The council is authorized to cooperate with the states, territories and possessions and their political subdivisions, and to issue reports on annual revisions of the natural resources inventory, an annual report on the council's operations, and on foreign sources of supply of critical and strategic materials.

The council is given broad power in regard to the development of research and fact-finding in all phases of natural resources including analysis of quantities, limitations, shortages and potential production of minerals, metals, oils, timber, hydroelectric power, subsoil water tables, soils, food resources, wildlife and all other natural resources and their relationship to industrial and social economy.

For the purpose of exploration and development of mineral resources, the bill calls for an annual appropriation of $10,000,000. An additional $10,000,000 is to be authorized for laboratory and demonstration tests in mineral production and utilization.

Also provided for is an acceleration on a national basis of surveys and appraisals authorized by the McSweeney-McNary Act, the Soil Erosion Act, the Bankhead-Jones Act, the Flood Control Act, the Agricultural Adjustment Act, and any other acts providing for studies, investigations, researches and surveys in problems relating to agriculture and forestry including the development of new and improved uses of agricultural and forest resources.

AFA Members Elect New Officers

BY referendum vote of the members of The American Forestry Association, William Starke Rosecrans, of Los Angeles, California, was reelected for a sixth term as President; and I. J. Roberts, of Washington, D. C., was reelected Treasurer, both to serve for a period of one year. C. P. Wilber, State Forester, New Jersey Department of Conservation, was reelected to serve as Director through December 1947. Two new Directors were elected—James J. Storrow, of Massachusetts, treasurer, Society for the Protection of New Hampshire Forests; and G. F. Jewett, of Washington, chairman, Forest Conservation Committee, National Lumber Manufacturers Association. Mr. Storrow will serve the association for a four-year term, and Mr. Jewett for three years.

Twenty-one Vice Presidents were elected to serve during 1946. They are as follows: Henry H. Arnold, Virginia, General of the Army, U. S. War Department; Henry J. Brunnier, California, president, American Automobile Association; Dr. L. C. Chadwick, Ohio, secretary, National Shade Tree Conference; Paul Clement, Minnesota, president, Izaak Walton League of America; Dr. Wilson Compton, president, Washington State College; Mrs. John W. Donaldson, New York, chairman, Conservation Committee, the Garden Club of America; Miss Marie E. Gaudette, New York, nature adviser, Girl Scouts of America; P. H. Glatfelter, Pennsylvania, chairman, Forest Industries Council; Dr. Roy L. Green, Colorado, president, Colorado A. & M. College; Walter W. Head, Missouri, president, National Council, Boy Scouts of America; Don P. Johnston, North Carolina, vice president, North Carolina Forestry Association; Judge Harley Langdale, Georgia, president, American Turpentine Farmers Association Cooperative; Duncan McDuffie, California, president, Save-the-Redwoods League; Earl McGowin, Alabama, vice president, W. T. Smith Lumber Company; Benton MacKaye, Massachusetts, president, The Wilderness Society; Robert Moses, New York, chairman, New York State Council of Parks; J. J. Pelley, District of Columbia, president, Association of American Railroads; Mrs. Oscar Palmour, Georgia, eastern representative, Conservation Committee, General Federation of Women's Clubs; Honorable Earl Snell, Oregon, Governor of Oregon; R. Worth Shumaker, Indiana, acting director, National Americanism Commission, The American Legion; William B. Warner, New York, president, National Publishers Association, Inc.

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(*From page 75*)

There are, of course, many other dramatic examples of packaging research at Madison; indeed, one would be hard pressed to name a single item essential to warfare that was not adequately packaged for safe and economical shipment overseas. Guns, ammunition, aircraft, tanks, trucks, food, clothing, medical supplies — these were the things packaging research delivered into the hands of our troops, and those of our allies. And because they were delivered intact and ready for instant use, we were able to surge to final victory in 1945.

Thus packaging will go down in history as the laboratory's greatest war accomplishment. But from a purely research point of view, it is overshadowed by achievements in design and construction of wood aircraft. For this program, undertaken in 1941 at the request of the Army and Navy, cut across many of the laboratory's research activities.

It involved, for example, a thorough-going investigation of the strength of wood, plywood, the new modified woods such as compreg and staypak, the new paper-base laminate called papreg, and the equally new combinations of different materials known as sandwich construction. It involved strength studies of joints and fastenings in aircraft, such as the highly critical joint between the wing spar and fuselage, and of such aircraft parts as cargo flooring and wing spars. It involved glue research and development, studies of pulp-reinforced plastics, new methods of examining wood quickly for detection of strength-impairing defects.

That the program was highly fruitful is evidenced by the fact that 25,000 training planes and gliders wholly or predominately of wood construction were built during the war period.

Perhaps fortunately, the laboratory since World War I had maintained some research on design of wood aircraft and was able, soon after Pearl Harbor, to prepare guides and manuals summarizing the best information then available for the initial production of both training planes and gliders. But it soon became apparent that a major research job was necessary. Modern military planes, even for training purposes, could not be satisfactorily designed of wood and plywood and the new sandwich materials because the basic strength and other properties of these materials had not been sufficiently assayed. So intensive studies were launched in the late summer of 1942.

One of the first steps was to select the best of the new synthetic-resin glues emerging constantly from the nation's glue factories. Some required high temperatures to effect cure, others low temperatures, and still others intermediate temperatures. Also, they varied greatly in composition, strength and durability under various conditions of use.

The properties of these new glues were assessed so that airplane producers could use them with assurance of adequate performance. Plywood made of new adhesives was tested for strength and durability and to determine the effects of grain direction of the veneer, thickness of veneer, and other manufacturing variables. Meanwhile, the laboratory carried on its own glue research. It found, for example, that by mixing preservative chemicals with glues made from soybeans or casein, the resistance of these glues to mold and decay could be greatly increased. As a spokesman put it, "The virtue of these old glues was that they could be cured at ordinary temperatures, while most of the synthetic resins required elevated temperatures."

Part two of the 1942 program of study had to do with strength of wood aircraft parts with the objective of setting up more accurate design criteria.

"The research," said T. R. C. Wilson of the laboratory's timber mechanics division, "related largely to plywood because plywood is one of the most efficient forms of wood for aircraft construction. Veneers varying in thickness from one one-hundredth to one-tenth of an inch are laid up usually with the grain direction at right angles in adjacent layers to whatever total thickness is required, and bonded together with glue. Minimum thicknesses are necessary, of course, in order to minimize weight. Thinness is, however, limited in many instances by resistance to buckling, hence it was necessary to investigate both the resistance and the conditions under which buckling occurs.

"In addition to the effect on the strength of the structure, freedom of the surfaces of wings and fuselage from buckling or wrinkling has another important value," he brought out. "Irregularities of surface, even very minor ones, cause turbulence of airflow and thus retard speed and require increased power. Smoothness of surface is essential to the movement of aircraft at high speeds such as the 600 miles an hour attributed to jet propulsion. One very efficient means of providing smooth surfaces in combination with the necessary structural strength is the use of what is termed sandwich construction.

"This consists of a considerable thickness of a lightweight core overlaid on both sides by thin facings of a hard, dense, strong material. The walls of the fuselage of the famous British Mosquito bomber consist of a half-inch balsa core faced with birch plywood one-sixteenth of an inch thick. We are now extending investigations to sandwich construction, consisting of balsa and various new dense synthetic materials, such as cellular cellulose acetate, in combination with such facings as plywood, papreg, resin-impregnated glass cloth and aluminum. The object is to establish principles and engineering formulas that will be applicable to any combination of materials and will make it possible to use sandwich construction with assurance in the airplanes of the future."

Papreg, which promises so much in sandwich construction, is made by impregnating sheets of special paper with synthetic resin and compressing them together under heat to form either flat or curved products. It is one-half as heavy as aluminum per unit of volume and can develop a tensile strength of 35,000 to 50,000 pounds a square inch, which is comparable to that of certain aluminum alloys on a relative weight basis. The product owes its high strength properties to the kind of paper from which it is produced. It can be made from a special thin and dense paper which is produced from high-strength softwood pulp.

Millions of dollars' worth of this amazing laminate were manufactured for war uses—as gun shields, gunner seats and floor sections for the famous B-24 Liberator bomber, as ammunition boxes for fighter aircraft and as rocket firing tubes.

Additional millions went into the production of compreg, the name given by the Forest Products Laboratory to their stable form of resin-treated compressed wood — for airplane propellers, for radio and radar antenna for military aircraft.

(*Next month, more improved woods, how wood aircraft propellers and structures are repaired, and modern techniques in bag-moulding plywood.*)

Big Timber

(*From page* 70)

means liquidating that form of capital.

Complete abandonment of these timber management methods is foreseen. There would be substituted continuous or sustained yield, made possible by extension of permanent forest roads throughout all stands. There would be anticipation of mortality in small trees, salvage by light and frequent cuttings of decadent timber. Thus there would be no necessity for making depletion charges. The expenses of holding old-growth would be met by drawing on elements of the stand that would otherwise be lost. Gains from increase in stumpage value would not be lost in a cumulative expense account.

Foresters will be interested in the silvicultural aspects of the thinning programs and in the economic possibilities of the understory which may result. In young forests composed wholly of shade-enduring species or in mixed forests including such species, thinning programs may by age 60 encourage new regeneration under shelter of the older trees. This will do no harm but may develop into an understory growth similar to that commonly found in the Douglasfir region, where the best old-growth fir frequently has a heavy understory of western hemlock. Because of the late felling age of Douglasfir, the hemlock may have ample time to develop to pulpwood size before the last fir is cut. Obviously it is a matter of free choice whether to cut the hemlock at that age or let it develop further. Similar situations may develop with other species.

Where the shade-enduring species are not found, favorable conditions for regeneration of the more light-demanding species will generally occur when the mature stand has been reduced to 15 or fewer trees an acre. Under these conditions the old stand overlaps the young so that the period between final removal of the old and resumption of cuttings in the young is shortened. This obviously will increase average rates of wood production upon an acre.

There are large areas of young stands past the age—30 to 40 years—when first thinnings normally should have been made, that will contain more unsatisfactory trees than properly managed stands. Still the quality of these species is such that stands up to 80 or 90 years may be carried to quality producing ages. Since these closely spaced trees have not been improved in wind firmness by early

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and regular thinnings, it is necessary to thin very lightly, at shorter intervals. From 10 to 15 percent of the stand volume should be removed every five years until the stand is in shape.

With the magnificent big timber species and forest stands available to forest owners on the Pacific Coast, no continuous yield management can rank lower than one which produces only small, low-value trees and logs. There are hundreds of millions of acres in the United States suited to production of this small timber, with only a few million acres of superlative forest producing area.

Looking briefly at the financial side of the picture, during the professional lifetime of the writer, he has seen log volumes in the Puget Sound market creep up from the $4 to $8 figure to a current range of from $20 to $50 a thousand board feet—and the latter for logs of much lower grade. The next generation of foresters should expect to see stumpage values increase still more. True, part of the increase was, and in the future will be, inflation, but part must be recognized as an adjustment to intrinsic values. Why grow $2 stumpage exclusively when it is just as easy to grow $20 to $50 stumpage.

As a final financial note it should be recognized that growing high-value timber means continuation of a maximum investment per forest acre. But such an investment yields returns every year, provided the area held will support an annual cutting operation of efficient size. If no timber is cut that will not yield net returns, all costs are met currently. The bug-a-boo of compound interest costs is banished and costless forestry, except for the permanent investment, is substituted.

Virginia Deer Hunt

(*From page* 80)

under multiple-use management and the U. S. Forest Service and the Virginia Commission of Game and Inland Fisheries have been handling many of their mutual problems sympathetically. The desirable solution was to work out a joint management, looking toward the rapid restoration of upland game.

Typical of the views held by students of the wildlife situation in Virginia were those urged by Justus H. Cline, now a director of the National Wildlife Federation. An ardent naturalist, retired mining engineer and former state geologist, "Jud" Cline lives at Stuarts Draft, close to where the Shenandoah Valley opens into the broader Valley of Virginia and near where the Jefferson and the George Washington National Forests come together on opposite sides of the James River. He had already been of help in the establishment of the Big Levels Wildlife Area in the upper tables and ridges of a portion of the Blue Ridge Mountains in the George Washington National Forest.

Sitting one day on a stump near the Big Levels area, Cline put into words the thought that was crystallizing among foresters and game men. "The state owns the squirrels," said Jud, "and the federal government owns the trees and nuts to house and feed them. It would be wonderful for the wildfolk of the forests if the public agencies could undertake a combined action program for environment and population controls."

In March 1938, the state passed an enabling act and shortly thereafter a plan was worked out between the State Game Commission and the federal Forest Service—a plan now known widely and favorably as the Virginia Plan—for a joint wildlife management program on public forest lands stretching over broken but extensive areas from Winchester to the Tennessee and Kentucky lines.

One of the first necessary steps was a restocking program. This continued the existing fish stocking arrangements and included both deer and wild turkey stocking. Fawns and adult deer were trapped on the Pisgah National Forest in North Carolina, and in Michigan and Wisconsin, transported by rail and truck, and released on the Virginia stocking areas. To date, a total of 1,783 deer has been released in suitable unstocked ranges in 23 counties.

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Wild or uncontrolled dogs and poaching have been problems. But these are being brought under control. Periodically representatives of the federal and state governments meet and lay out plans for openings, cover planting or release of food trees and plants, census taking, hunting and similar details of game management. From Pittman-Robinson funds and from a special one-dollar tax on big game hunting in the national forests, the program is financed to permit the employment of technicians and wardens, all of whom live in the areas and some of whom occupy cabins right on the ranges. These men carry out the plans, looking after food supply, protection and similar matters.

The plan is working. Wild turkeys are coming along; deer have increased from practically nil to a shootable surplus in eight years. A modern miracle, the sportsmen call it.

Through the control of dogs and the curtailment of unlawful shooting and by providing adequate feeding, romping and shelter areas, the deer families have multiplied many times since the original animals were transplanted to their new Virginia home. Game management authorities estimate that the surplus available for shooting will be limited for several years, but the 1946 season opened 14 of the 23 counties involved in the program to at least a two-day hunt of two-pronged bucks.

In six of the southwestern Virginia counties where hunters were experiencing their first deer hunt a total of 169 bucks was taken—all legally—from a population of over 2,400. The condition of the herd after the hunt is rated as excellent; in fact, it is thought that the hunt had a beneficial effect on the deer population. An outstanding feature of the hunt was the excellent condition and size of the deer taken. One 400-pound buck was shot on the Comers Rock area of the Jefferson National Forest and numerous other large deer were taken.

Thanks to the excellent public cooperation, particularly that of the sportsman, the deer management program is working out very well. The sportsmen have helped materially in overcoming the unlawful shooting and dog problems, and they have kept themselves intimately informed on the many angles of the broad management program. It is because of their knowledge of what it takes to develop adequate game populations that the sportsmen are so anxious to keep the public advised on what such management involves.

Austria

(*From page* 61)

worked by groups (group shelterwood). There are many modifications and combinations of the selection and shelterwood systems in use; altogether, over 30 percent of the area under forest management is handled under these partial cutting—as contrasted with clear-cutting—systems.

Besides the high forest (trees originating from seed) systems, which together are applied to 95 percent of the total forest area under management, the coppice method of regeneration is used in a few places, primarily for the production of fuelwood. Coppice stands are of stump sprout origin, rather than from seed, the stems arising in clumps. They are too crooked and limby to produce good sawtimber. When the trees have attained fuelwood size, the stand is clear-cut and the stumps allowed to produce another crop of sprout stems. In the so-called coppice with standards method, scattered individual trees of superior quality are permitted to go through a second (or third) rotation, in this way producing a crop of both timber and fuelwood. The straight coppice method of stand renewal is in common use by farm woodlot owners in the northeastern United States and is chiefly responsible for the marked deterioration in forest composition and tree quality in that part of the country.

Such intensive cultural treatments as one sees in Austria must be carried out under the supervision of highly skilled foresters on the ground. In the United States, the compar-

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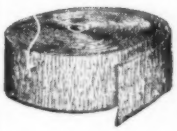

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atively small degree to which such treatments are applied is explained not entirely by unfavorable economic conditions, but also by a shortage of experienced foresters who are able to proceed with the application of intensive cultural measures with full assurance of their results. We are still largely in the experimental stage of silviculture.

Along with the development of intensive practices in silviculture there has been, over the years, a complementary growth in associations and bureaus having to do with the utilization and marketing of forest products. There is in each province of Austria a chamber of agriculture, the activities of which include forestry. Membership is compulsory for all farmers and forest owners, who are required to pay a small fee. There is a president assisted by a number of directors employed by the chamber, and experts in the various branches of agriculture and forestry, such as dairying, sugar beet production and silviculture. The forestry specialists and their assistants travel about the country bringing to the chambers the latest information on techniques and market conditions, performing much the same kind of service as the Agricultural Extension Service in the United States.

In addition to the provincial chambers of agriculture, there are also chambers in each district (corresponds to a county). Members elect a council, which serves as a liaison between the district and provincial organizations. The district chambers deal mostly with problems of the small forest owners, several meetings being held yearly. An experienced forester is connected with each district chamber, but not under full-time employment. The chambers of agriculture have the authority to review all impending agriculture and forestry legislation and exert considerable influence on the government. The presidents of the provincial chambers meet in Vienna as often as necessary to coordinate their activities.

Also in each province are associations composed of large owners of forest properties (*the Waldbesitzerverbande*). They were initiated as a result on the part of such owners of some dissatisfaction with the chambers of agriculture. A central committee of the association sits in Vienna. The marketing bureaus for forest owners were instituted by these associations.

Since 1935, there have been marketing bureaus for forest products the purpose of which is to reduce the middleman's profit, improve merchandizing practices and better organize the sale of forest products by combining the products and transportation facilities of local groups of forest owners. According to the Austrian Ministry of Agriculture and Forestry, all but the smallest owners took advantage of this service. These associations are still in existence, but the Nazis abolished the associations of larger forest owners.

There were a few forest products marketing cooperatives before the war, but these were abolished under the Nazi regime and their present status is not known.

Mention should be made of the Austrian provincial associations for the protection of hunting (*Landesjagdschutzverbande*). Hunting is an important business in Austria, and management of game is a recognized profession. Before the war there were over 4,000 professional hunters under full-time employment, and the total value of rental paid for the use of hunting grounds was 11 million shillings. There were 40 public game preserves, 5,500 private hunting grounds used by the owners and 4,800 private hunting grounds leased by the owners.

To return, in conclusion, to the question of whether the Austrian forests can again come to the rescue of the Austrian economy, I am able to report that notwithstanding overcutting during the war years, it is planned to export in the current year 286 thousand metric tons of sawn lumber, equal to 45 percent of total anticipated lumber production, together with a small portion of the production of both mine timbers and round timber for sawing. This plan was developed by the office for the distribution of wood (*Holzwirtschaftsstelle*) after careful consideration of the reduced growth rate of the forests—estimated to be about 10 percent below the prewar level—and the need to rebuild forest growing stocks as quickly as possible, consistent with greatly increased domestic rehabilitation requirements. Because forestry is fully and generally accepted as an integral part of the nation's economy, we may be confident that the restoration of the Austrian forests to full productiveness—a process estimated to require from 20 to 30 years—will be carried out with persistence and skill and in the best interests of the people.

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De-Nazified Forestry

(*From page* 54)

(approximately 23 million acres) of forest, of which 37 perecent is in the American zone, 28 percent in the Russian, 18 percent in the British, and 16 percent in the French zones. The total volume of standing timber is estimated at 724 million festmeters (183,896,000,000 board feet) of which 225,600,000 are in the American zone.

The annual forest increment in the U. S. zone is estimated at 9,160,000 festmeters. Forest product requirements to be met from the American zone for the forestry year 1945-1946 total more than 12 million festmeters (3,048,000,000 board feet). To meet these requirements, the military government plans to cut 150 percent of the annual growth. It was pointed out, however, that this does not mean a depletion of the German forests to the extent that the 150 percent would indicate. Little or no cutting had been done in the years 1944 and for the first half of 1945. In effect, the 150 percent may be considered as including 100 percent of the current year's growth, plus a drawing equal to the other 50 percent from a "stockpile on the stump."

The cutting plans for the 1945-1946 forestry year do not reduce the war potential of the German forests, but over the period of occupation systematic exploitation of the forests may have that result. Such exploitation, however, will be designed to insure that the forests remain in good condition with regard to density of stocking, so that civilian peacetime needs will continue to be met and danger of floods and erosion will not result.

Many of the German forests have in the past been operated on rotations of 80 to 120 years. To meet the needs of military occupation, reconstruction of war damage, maintenance of a minimum civilian economy, and to provide a reasonable amount for export, it may be necessary to reduce all rotations to 80 years.

From the 120-year forests it will be possible to withdraw the equivalent of 40 years' growth to assist the country's civilian economy, and at the same time reduce the reserve supply of wood which otherwise might be usable in a war program.

In the entire Rumpf-Reich, the annual wood requirements to maintain a minimum civilian economy and to provide for reconstruction is expected to reach about 45.5 million festmeters (11,557,000,000 board feet). The planned annual drain will be about 50 million festmeters, thus leaving about 4.5 million for export. The total annual growth is about 25 million festmeters. If this rate of cutting is maintained, the war potential in wood reserves will be destroyed, but the forests will still be able to support civilian needs at the end of the reconstruction period.

How long will this process take? It is not known definitely which of several plans might be followed. It is known, however, that the authorities are thinking in terms of from 10 to 20 years of occupation and systematic control.

AUTHORS and PHOTO CREDITS

ALBERT ARNST (*Fuel Specialist*) is forestry specialist for the Soil Conservation Service. A. C. CLINE (*Forestry Is Big Business in Austria*) is chief of the program section of the Lumber and Lumber Products Branch of the Civilian Production Administration, on leave of absence from the Harvard Forest. BURT P. KIRKLAND (*Let's Grow Big Timber Too*) is regional consultant of the Pacific Coast states on the Forest Resource Appraisal of The American Forestry Association. JOSEPH S. STOECKELER (*The Epic of Minnesota's Forests*) is a forester with the Lake States Forest Experiment Station. RICHARD C. STONE (*Death in the Wilds*) lives in Hampton, Middlesex, England.

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Arnst, Albert—pages, 76, 77, 78 and 79
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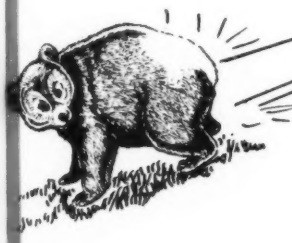

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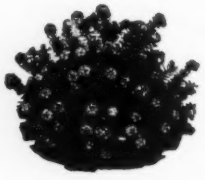

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